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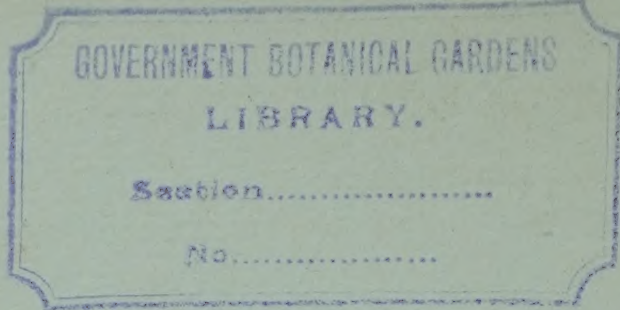
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has been accomplished under his capable hand. And having read his proofs I find nothing to criticise, and can but admire the ability with which he has marshalled a vast mass of information never before brought together, and told a story with words of befitting gravity and simplicity which is to me of the deepest interest, and, I am persuaded, can be scarcely less interesting to its other readers.

These few words would be sufficient to introduce those who have worthily taken part in the production of the book. But, looking back upon Kew in a long retrospect, I may summarise some of the salient impressions which emerge from the mass of detail. Amongst our scientific institutions, Kew stands out with a history which is almost august. And it is characteristic of English tradition that its present constitution is the outcome of an almost inevitable evolution. Circumstance has made it, and this has given it a stability which it would not have possessed if it had been the creation of the moment, however logical.

Outside the metropolis there is probably no spot which has seen so much of our history as the piece of ground included within the bend of the Thames which lies between Kew and Richmond bridges. Successive dynasties made it their residence, first in its southern and then in its northern portion. Henry VII. built the palace at Richmond, in which his successor entertained the Emperor Charles V. Queen Mary lived there, and in it Elizabeth signed the death-warrant of Mary Queen of Scots, and died herself. Her Court, on their way to London by Brentford Ferry, must have passed along Love Lane, which traversed the Gardens. Here was the original hamlet of Kew, which in Hanoverian times was moved eastwards round Kew Green. The etymology of the name is obscure, but the earliest form, Kayhough, was perhaps derived from the landing-place of the ferry. Midway, at Ormonde Lodge, George II. gave Sir Robert Walpole a rough reception when he was roused to hear of his accession to the throne, and it was in the adjoining gardens that Sir Walter Scott placed the interview of Jeanie Deans with Queen Caroline, one of the most capable of our queens. At Kew itself was the



INTRODUCTION

It had long been my desire to write some sort of history which would trace the beginnings and development of Kew and of all the name stands for. I believe that my predecessor in the directorship cherished the hope that he too might accomplish the task, and I suppose that in each case the same causes defeated the intention. As with many other Government posts, the man who would control all the various activities of Kew must "scorn delights," even those under his immediate eye, "and live laborious days"; he must be content, however imperfectly, to do what he can, not what he would; and must swallow, with what philosophy he may, continual discontent that the day's work cannot be crammed into the day's hours. No assistance can aid him beyond a certain point, and no one can share his responsibility.

For some years past, Mr. Olivier and Mr. Wallis—the one with the brush, the other with the camera—had devoted themselves to the illustration of Kew in its varying aspects with delightful skill. The publishers were willing to give a selection of their admirable work to the public if only the long-projected book could be produced which it would serve to illustrate. The opportunity was not to be lost; it might not, and probably would not, ever recur. That the thing must be done at Kew was obvious; history may be evolved from consciousness, but it cannot be written with circumstantial accuracy without data and documents. It was a happy inspiration which led me to induce the publishers to entrust the work to the assistant curator. He has devoted his life to Kew, is penetrated by sympathy with its charms, and much that has enhanced them

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residence of the Princess Dowager of Wales and of her son, George III. Here he gave Lord Bute his dismissal, his children were brought up, and two of his sons, William IV. and the Duke of Kent, were married in the presence of the dying Queen Charlotte.

And the impress of this history remains on Kew. The various domains which compose it have been alternately united and dissevered. But in its main features it still remains as George III. left it, though it has been perfected and refined in its details. The Royal influence and atmosphere persist. It is the stately garden of a great personage, though that is now the British people and no longer the sovereign. I had the honour of showing it to the late Queen Isabella of Spain, and her Majesty said at the end of her visit, "It is in keeping with your country—spacious, and with nothing *mesquin*." And a Prime Minister remarked to me, "Our countrymen are fond of disparaging their institutions; but Kew, at any rate, is one they need not be ashamed of."

In truth, it possesses the grand manner which can be inherited but not acquired. Wealth may be lavished on a garden, but cannot give it the dignity derived from centuries of growth; and the wealthiest could hardly extend more care to Kew than the nation bestows, or, I might add, more respect than its visitors exhibit. Its very stateliness represses exuberance of conduct. This makes the labour of control easy. A vast Bank Holiday crowd feels that it is present at a full-dress reception, and behaves with irreproachable restraint. The avoidable damage at the end of a popular day may be covered by a few pence.

I claim that in this at least Kew performs a great educational service. It excites wonder by growing what is strange and exotic in an epitome of the world's vegetation. But successive directors have furnished it abundantly with flowers grown as far as climate will allow under more natural conditions, and these cannot but stimulate the latent sense of beauty in Nature where more artificial effort might appeal in vain.

The vast majority of the visitors to Kew doubtless do not realise that they owe its very existence to the inconspicuous side of its work, of which they can know little except what they can glean from the museums. It is improbable that the charms of gardening alone could have induced the Government to maintain it. Like that of many Royal residences in the past, its existence might have been transient but for the accidental circumstance that the Princess Dowager of Wales in 1759—by a notable coincidence the same year in which the British Museum was opened—commenced a small botanical garden at Kew for her own gratification. George III., who revered the memory of his mother as much as he detested that of his grandmother, Queen Caroline, and whose scientific tastes have never received due recognition, continued and extended the collections. In this he had the encouragement and advice of Sir Joseph Banks, who accompanied Captain Cook on his first voyage, and was for forty-two years President of the Royal Society. It was mainly due to Banks that two of the main features of Kew were started which are in vigorous operation at the present day: one was the making Kew the *depôt* for the interchange of plants with the Colonies, “which must prove of great advantage to the commerce of these kingdoms”; the other was the training of young gardeners for botanical and cultural posts abroad. Nelson, who was sent from Kew, stuck to Bligh in the mutiny of the *Bounty*, and died from exposure in the boat which was set adrift. Another Kew man, Hooper, was sent with Lord Amherst’s embassy to China. He remained in the East and helped to create Buitenzorg, the Dutch Kew in Java. So great was the prestige of Kew training that the Royal Family long retained the right of nominating two Hanoverians for employment.

Sir Joseph Banks was in advance of his time, and saw clearly that the Greater Britain would require the aid of a national botanical establishment for the scientific exploration and material development of the future Colonies. His aim was to secure this at Kew under Royal protection. He and George III. died in the same year. The decay of the King’s mind had seemed hopelessly to frustrate

Banks's intentions. He therefore did the best thing possible in the circumstances, and left the Colonial collections, of which he had been permitted to retain the charge, the papers relating to them, and his library to the safe custody of the British Museum. The fortunes of Kew were now at their lowest ebb. During the two succeeding reigns it was almost abandoned by the occupants of the throne. But for the filial affection of John Smith, the curator, the living plants might have perished. At the accession of Queen Victoria the establishment seemed a mere encumbrance to the Crown; the bulk of it had degenerated into a game preserve; it only remained to distribute the collections to seal its fate.

But Banks had not laboured wholly in vain. The English scientific world was outspoken in its protests. These ultimately reached the throne, and the memory of the Princess of Saxe-Gotha, Kew's first founder, perhaps turned the scale in its favour. Kew, phoenix-like, rose again from its ashes. The Government, of course, appointed a committee to give it some constitution. The report was presented to Parliament and given to the new director in 1841 for his guidance and in some sort as a charter. This was the kernel of its recommendations :—

A national garden ought to be the centre round which all minor establishments of the same nature should be arranged . . . receiving their supplies, and aiding the Mother Country in everything that is useful in the vegetable kingdom. Medicine, commerce, agriculture, horticulture, and many valuable branches of manufacture, would derive much benefit from the adoption of such a system. From a garden of this kind, Government would be able to obtain authentic and official information on points connected with the founding of new colonies: it would afford the plants these required.

This scheme contained the germ of every branch of Kew's ultimate expansion and development. The vast herbarium came into

existence because the vegetation of distant lands could only be studied at home by means of specimens ; these supplied the material for the botanical survey of the Empire which was early begun and is still in progress—thirty-seven volumes have been published ; the museums contained every kind of vegetable product capable of utilisation, and exhibited them in an instructive way ; the library was their necessary complement, as well as of the herbarium ; the laboratory furnished appliances for the investigation of plant-diseases and the study of the intimate processes of plant-life ; finally, the North Gallery revealed to an untravelling public the most striking features of the vegetation of British Possessions. Work so varied could only be accomplished by the co-operation of a skilled and numerous staff. This Kew has always had the good fortune to attract. I say good fortune advisedly, for the work involves in great measure the effacement of the individual where the establishment as a whole must bear the responsibility and receive the credit.

The relations of the Colonies and India to Kew have more than realised the expectations of the report. There are some sixty distinct governments under the British Crown—I have not counted them recently—and in any technical difficulty all have resort to Kew. It did what was possible when coffee-leaf disease brought financial disaster to Ceylon ; the fortunate identification of a single leaf started the rubber industry of the Gold Coast ; Kew sent tea to South Africa ; it gave cinchona to India, and a dose of quinine can now be purchased at any Indian post-office ; it transferred the South American rubber plants to the East, with results which have been described as fraught with “wealth beyond the dreams of avarice.” A chain of Kew-trained men dot the course of the future Cape to Cairo railway. Scientific members of the Kew staff hold important positions in India and the Transvaal, and a former assistant director has done noble work in restoring the agricultural prosperity of the West Indies. India has recognised its debt by supplying Kew with a director.

All this is better understood in the Colonies, and perhaps even

on the Continent, than at home. A diplomat in evening dress called upon me one morning to inquire on behalf of Prince Bismarck the "secret of Kew." I could only assure him that it simply consisted in assiduous attention to its business. I learnt subsequently that the German Chancellor thought the explanation entirely unsatisfactory. The French Government, in its turn, contented itself with a close inquiry into methods of administration and of Colonial supply.

Kew, in truth, has no politics or any aim but to accomplish useful work. The director is appointed directly by the Crown, and is therefore somewhat outside the ordinary Civil Service. But he is subordinate to a Minister who is responsible to Parliament for his administration, and has to procure for the establishment the vote for its maintenance. Kew was at first placed under the "Woods and Forests," which with a liberal expenditure gave the northern half of the Gardens its present character. In 1851 this Department was divided, and Kew passed to the new "Office of Works," losing the Old Deer Park, which remained under the control of the "Woods." Under the sympathetic administration of Lord Mount Temple, the southern half of the Gardens was dealt with. But the "Works" became a purely administrative office to which the aims and objects of a scientific institution grew gradually alien. Kew was therefore, in 1903, transferred to the Board of Agriculture and Fisheries, which has, at any rate, the merit of having a mind open to scientific problems, and is not wholly fettered by concrete detail.

Of the vast consultative work which Kew has to perform for those who, from Government downwards, seek its aid, the general public can know nothing. Only a trained experience and a rigorous method could deal with it. I have had to decide the fate of £20,000 worth of cigarettes seized by the Government because suspected of containing added sugar. A laborious investigation with the aid of an accomplished chemist proved that the suspicion was unfounded, and they were released. To compare great issues with small, I may

add that I have also been invited to advise the Turkish Ambassador as to the authenticity of mandrakes for the Sultan.

And here I lay down the pen and make way for Mr. Bean. This must serve as an overture to the detailed drama. Now and again I have sounded a *leitmotif* which will find its full expansion in his admirable pages. May the reader join with those who have played their part in the work, in the final *coda*: FLOREAT KEW.

W. T. THISELTON-DYER.

WITCOMBE.

August, 1908.

ROYAL BOTANIC GARDENS, KEW

PART I *ORIGIN AND DEVELOPMENT*

CHAPTER I

EARLY HISTORY OF KEW

THE history of the village of Kew, as apart from the world-famous Gardens to which it gives its name, need not detain us long. In old records the name was variously spelt; thus we find Kayhough, Keyhowe, Kayhoo, Kai-ho, Kaye, Keye, with other modifications, until finally it took its present form. The earliest mention of the village occurs in a Court roll of the manor of Richmond, in the reign of Henry VII. No event or catastrophe of national import has ever happened here. It became a Royal place of residence early in the eighteenth century, and it is owing to this circumstance, and to the gardens which the Royal Family afterwards founded, that the village is everywhere known to-day.

Kew
Village.

With the river bending round and guarding it on one side, Kew has, until comparatively recently, been somewhat apart from, although close to, great streams of traffic. On the opposite side of the Thames is the High Street of Brentford, not only part of the old route between London and the Court at Windsor, but also one of the main roads from the metropolis to the south-west of England. The traffic on the Surrey side of the Thames between London and the provinces left Kew considerably farther on one side. Thus, ensconced in its nook along the riverside, Kew preserved its old-world air much longer than many other London suburbs did. There are those still living who can recall the place as a sort of Sleepy Hollow—a pretty village consisting of substantial old houses clustering round the Green. One can well imagine the Kew of the early

nineteenth century to have been a typical English village, combining a quiet beauty with an air of unostentatious well-being. Those days have gone. Materially, no doubt, Kew is more prosperous than ever it was before, but on one side of the Green rows of latter-day villas have sprung up, while most of the picturesque old houses between the bridge and the chief entrance to the gardens have been transformed into tea-houses and restaurants, with all their unlovely accessories. Then steamboats, railways, and electric trams have each helped to swell the daily exodus from London in this direction. This, and the enormous growth in the local population on both sides of the river, have made the streets that converge on Kew Bridge some of the busiest in the south-western part of the metropolitan area.

Until comparatively recent times, Kew was a favourite place of residence of more or less notable people. Its contiguity to the old palace of Richmond naturally led to the residence here of people whose interest or duty made it incumbent on them to be near the Court. Here, in the reign of Henry VIII., lived Mary, Dowager Queen of France, sister of the King and third wife of Charles Brandon, Duke of Suffolk. But the house in which she lived—called Suffolk Place—was demolished during Queen Elizabeth's reign, and the spot on which it stood is not known, although it has been surmised that the Gothic crypt beneath the present Kew Palace is a remnant.

But, in addition to Royal personages—with whom, in the later times with which we shall have to deal, Kew had so long and intimate a connection—several famous or notable people have lived here. About the middle of the sixteenth century there lived at Kew William Turner, author of a famous Herbal, and known in later times as the "Father of English Botany." It is a singular and happy coincidence that such a man should have lived and maintained a garden in the place destined to become in after years the headquarters of the science to which he was devoted. But he died in 1568, and no connection can be traced between his garden and the Gardens of the present time. Its site even is not known.

Sir Peter Lely once lived in a house that stood on the spot now occupied by the west wing of the Herbarium. Gainsborough, perhaps, lived here; he is, at any rate, buried in the churchyard. Meyer,

once a miniature-painter to George III., occupied the house next to the Herbarium. Niepce, the original discoverer of the daguerreo-type, lived in Kew about 1827. Besides these, there might be mentioned numerous officials, etc., connected with the Court of George III. and his parents, as well as a succession of notable men attached to the Gardens.

**Court
Officials.**

Like most British institutions, the Royal Botanic Gardens of Kew have developed from small beginnings. Originally some nine acres in size, they have gradually extended their boundaries until now they cover an area of 288 acres. On the east they are bounded by the thoroughfare between Kew and Richmond, now known as Kew Road; on the south by the Old Deer Park of Richmond; on the west by the Thames; and on the north by Kew Green, and the private grounds of Kew Palace and the Herbarium.

Kew Gardens as they exist to-day are a combination of several properties. Only two of these, however, are of chief importance: first, the grounds attached to Kew House, a Royal residence at Kew, demolished in 1803; and second, the grounds of the Royal residence at Richmond known as Richmond (or Ormonde) Lodge, which stood in the present Old Deer Park until 1772. The rest of these properties are comprised in the grounds of the present Kew Palace and Herbarium, and in the gardens that once belonged to a series of houses on the south side of Kew Green, which are now Crown property. The two great demesnes just mentioned first became united under the one ownership when George III. bought the freehold of Kew House some time subsequent to 1772. They do not appear actually to have been united until 1802, having been up to that time divided by an ancient foot-road or bridle-path called Love Lane, which extended from Richmond Green to the Horse Ferry across the Thames between Kew and Brentford. Up to the time of their union under the auspices of George III., the histories of the Richmond and the Kew properties are quite separate and distinct. The Royal occupation of Richmond Lodge was anterior to that of Kew House, and may here be dealt with first, although the history of the Botanic Gardens of Kew is more closely associated with the latter.

**Origin of
Kew Gardens.**

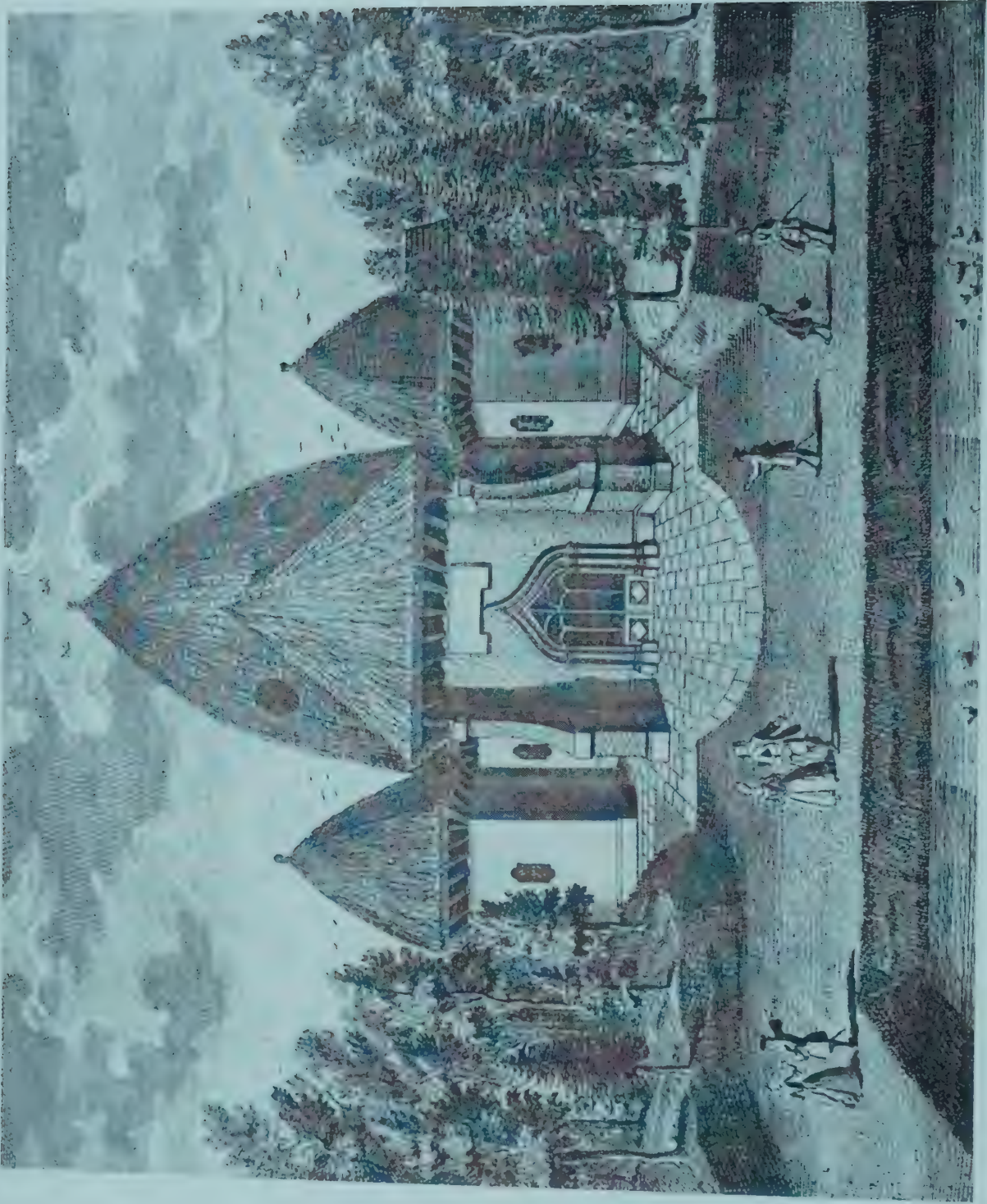
CHAPTER II

RICHMOND LODGE AND GARDENS

THE old historic palace of Richmond has nothing to do with this story. It stood on the banks of the Thames on a spot a little distance above the present railway bridge at Richmond.

**Richmond
Old Palace.** Up to the reign of Henry VII. the town was known as Sheen, and Sheen had been a place of Royal residence since the reign of Edward I. When Henry VII. built his new palace on the site of an older one destroyed by fire, he changed the name of Sheen to Richmond—his own title, prior to the Battle of Bosworth, taken from Richmond in Yorkshire. Richmond Palace continued to be a place of residence for Royalty until the time of Charles II., although it evidently declined in favour with successive sovereigns. Finally, it fell into a semi-ruinous state, and but few vestiges of it now remain.

The Richmond Lodge—also called “Ormonde Lodge” and occasionally “Richmond Palace”—a portion of whose grounds now form the western part of Kew Gardens, did not come into Royal occupation until the reign of the first George, probably about 1721. The house—or more properly a house that stood on the same site—had even then, however, a certain history. It was to this house that Cardinal Wolsey retired after his fall from power in 1530. For nearly two centuries after that it was occupied by Royal servants and private gentlemen, until in 1707 Queen Anne gave a lease of it to the Duke of Ormonde. The Duke pulled down the house that had sheltered Wolsey and erected a new one on the site. During the critical times that followed the death of Queen Anne, he did not manage his political affairs with the dexterity shown by so many of his contemporaries. He was impeached in 1715, and his estates became forfeit. Some six years later, however, the lease of the Richmond property was restored to the Duke of Ormonde’s brother, the Earl of Arran, and by him was disposed of to the Prince of Wales, afterwards George II.



RICHMOND GARDENS IN THE EIGHTEENTH CENTURY: MERLIN'S CAVE.

Richmond Lodge then became a favourite residence of George and his consort, Princess Caroline of Anspach, especially of the latter ; and when George II. became king in 1727, Queen Caroline commenced many costly and elaborate improvements in the gardens and grounds. Her chief professional adviser appears to have been Bridgman, a notable landscape-gardener of his time and an apostle of the "natural" school. He is even said to have ventured so far as "to introduce cultivated fields, and even morsels of a forest appearance" into the Royal Garden at Richmond. Bridgman was the first to introduce the sunk fence, or ha-ha. This useful device, which provides an effective boundary without obstructing the view, is employed to divide the present Kew Gardens from the river Thames and from the Old Deer Park.

One of the means adopted by Queen Caroline to give interest and diversity to Richmond Gardens was the erection of fanciful buildings. The most celebrated of these was Merlin's Cave, a structure which created an extraordinary interest at the time it was built, and the echoes of whose fame linger even to our own days. It is not easy at the present time to appreciate the reasons why this fantastic building should have acquired the reputation it did. The chief attraction, possibly, was its name. A picture of Merlin's Cave is given on John Rocque's "Exact Plan of the Royal Palace Gardens and Park at Richmond" (1754). From this it appears to have been a sort of summer-house consisting of three compartments—a large central one flanked on either side by a smaller one. Each section had a conical thatched roof very much resembling an old-fashioned beehive. Inside the building were wax figures of Merlin the Enchanter, Queen Elizabeth, a queen of the Amazons, and others. The incongruity of this gathering is explained by the supposition that the queens were there as clients of the magician. This structure, which in its own day did not escape ridicule, was built merely of wood and plaster. According to an old engraving in the Kew collection, it was designed by Kent. It shared the fate of similar structures, even of Richmond Lodge itself, and was destroyed about 1770.

By some unexplained circumstance, the name of Merlin's Cave was afterwards transferred to a small stone house and cellar which stood a short distance south-west of the present Temperate House.

This is believed to have been constructed by the sons of George III., playing at building, with the help of a bricklayer. When the Rock

The Stone House. Garden was being made in 1882, the materials of this building, which had become overgrown and little more than a mere heap of stones, were used to eke out the

rather scanty supply. About this ruin the legend had gathered that it marked the entrance to a subterranean passage under the Thames to Sion House, a story which has no more foundation than many other similar ones in the country. The original Merlin's Cave stood on a spot about fifty yards from the southern corner of the present lake, in a north-easterly direction.

Another curious and noted structure built by Queen Caroline about the same time as Merlin's Cave was the Hermitage. It stood

The Hermitage. some 300 yards north of Merlin's Cave, and was separated from it by an open or thinly-wooded expanse known as the "Forest Oval." The building had three arched entrances, and was built of stones "rudely laid together." The interior is described as of octagonal shape, with niches in which were placed the busts of famous men, among them Newton and Locke. Verisimilitude was given and (as we are told by a contemporary author) the venerable look of the whole improved, by a "solemn grove behind and a little turret on the top with a bell, to which you may ascend by a winding walk." George III. was not troubled with any excess of sentiment in regard to his grandmother's work, and the Hermitage went the way of Merlin's Cave. It stood about a hundred yards south-west of the present Azalea Garden.

The other buildings erected by Queen Caroline were, as we gather from contemporary accounts, a temple, situated on a mound, with a circular dome crowned with a ball and supported by Tuscan columns; a dairy house, apparently used as such; the Queen's Pavilion, a neat, elegant structure wherein was seen a beautiful chimney-piece, copied from a design by the architect, Andrea Palladio; a "summer-house on the terrace," giving a view of "that noble seat called Sion House." The mound on which the temple stood still remains to mark the site, which is the extreme south-west corner of the Queen's Cottage Grounds. It is now covered with large trees. The "terrace," or a portion of it, still remains. It is now, as it was then, a favourite promenade, extending from the Brentford Ferry to the Isleworth Ferry Gate.



RICHMOND GARDENS IN THE EIGHTEENTH CENTURY : THE HERMITAGE.

To judge by contemporary plans and descriptions, some portions of the Royal Gardens at Richmond were, in the middle of the eighteenth century, very pronounced examples of the “natural” school. Their general outline was, roughly, a narrow triangle the apex of which was near the present Kew Palace, the base at Richmond Green and portions of what is now the Old Deer Park, and the sides of which were, on the west, the Thames, and, on the east, Love Lane. Wooded areas traversed by numerous serpentine paths were separated from each other by meadows and cornfields. Other portions were allowed to run wild with broom and gorse as cover for game, and the term “wilderness” frequently occurs in descriptive accounts. It is a curious instance of the persistence of names that the semi-wild and uncultivated parts of Kew are even now, when nearly two centuries have elapsed, alluded to as “the wilderness.” In contradistinction to this phase of landscape art, which appears to have secured the enthusiastic admiration of contemporary writers, there were, near Richmond Lodge, plots and borders arranged in formal fashion, and a large portion of what is now the Old Deer Park was traversed by avenues of trees. The most notable of these avenues was one more than a mile long, extending from Richmond Green to the northern apex of the Gardens. This avenue was called the “Forest Walk,” and ran pretty nearly parallel with the eastern boundary of the Gardens and Love Lane.

In 1730, or about that date, Frederick, Prince of Wales, leased Kew House and its grounds from the Capel family. The southern extremity of this property was—as it is now—near the spot on which the Pagoda was afterwards built. At this time both the King and Queen were on hostile terms with their son and new neighbour, who had set up his rival Court within a mile of Richmond Lodge and whose domain was only separated from their own by the ancient bridle-path which has already been alluded to, Love Lane. It is not easy now to trace the exact course of this famous by-path. But, roughly, it would follow pretty closely the present long, straight “Holly Walk,” and thence run eastwards of, and somewhat parallel to, “Stafford Walk” to Kew Palace lawn. It would cut the present area of Kew Gardens into two fairly equal parts. Love Lane gave the people of Richmond an almost direct route from their Green to Brentford Horse Ferry. With the supersession of the ferry by the building of the first Kew Bridge in

Richmond
Gardens
in 1754.

Love
Lane.

1758-9, it ceased to be of much use as a thoroughfare. It became less frequented, and is said to have ultimately become the resort of bad characters. For this reason, and still more because the death of his father and grandfather brought both the Kew and the Richmond properties into his own hands, George III. obtained powers from Parliament in 1765 to close Love Lane. For causes not very apparent now, this Act does not appear to have been operative at the time and, according to local tradition, Love Lane did not entirely disappear until 1802.

The King, in return for the privilege of abolishing the path, made the present Kew Road in the year 1767. Previous to this date, this now busy thoroughfare was known as Kew Lane, and was unfitted for vehicular traffic. The main route from Richmond to Kew was by way of the present Lower Mortlake Road, and a lane through the fields northwards. Besides making the new road, which is said to have given employment to 300 men, the King also agreed to keep it in repair. This duty, afterwards undertaken by Government, was in 1884 transferred to the local authorities, the expense being commuted by the annual payment to them of a fixed sum from the public purse.

In 1737, Queen Caroline died. She had made the embellishment of Richmond Gardens the chief diversion of her later years, and although her income from the time of the accession of George II. had been £100,000 per annum, it was found after her death that she was £20,000 in debt, largely due, it was believed, to her lavish expenditure on the gardens at Richmond and Kensington. From the time of her decease to that of George II. in 1760, little alteration took place in the grounds and gardens of Richmond Lodge, for the King did not share his consort's tastes in these matters. The house, however, continued to be a favourite resort of his, especially in summer.

With the accession of George III., and the frequent occupation of Richmond Lodge by him during the next ten or twelve years, the character of Richmond Gardens was greatly changed.

Nearly all traces of the work of the Queen and her two chief advisers, Bridgman and Kent, disappeared. The young King had the assistance of another landscape artist, even more famous than his predecessors. This was Launcelot—or, as he was nicknamed, "Capability"—Brown, who afterwards left his



EVENING IN THE RHODODENDRON DELL

mark on Kew Gardens. The Rhododendron Dell, or "Hollow Walk," as it was originally called, is believed to have been made under his direction. But with regard to the Royal Gardens of Richmond, his work appears to have been destructive rather than constructive. Merlin's Cave and the Hermitage were destroyed, and the gardens were gradually remodelled in accordance with the new ideas of "Capability" Brown. To satisfy the agricultural tastes of George III., a great part of the Deer Park was converted into the wide expanse of pasture-land it still remains.

The process involved the destruction of a hamlet known then as West Sheen, which in earlier times had been the site of a Carthusian monastery, founded in 1414 by Henry V. The spot is marked by the present Kew Observatory, which was built in 1769 from the designs of Sir William Chambers. The immediate purpose of its erection was to observe the transit of Venus which occurred in that year.

It may here be mentioned that with the demolition of Richmond Lodge in 1772, its kitchen and flower gardens were added to the Deer Park, which then assumed pretty nearly its present form and dimensions. The only alterations of any importance were the addition to it, early in the nineteenth century, of some land on the Kew Road side, purchased by George III. from the Selwyn family; and the subtraction from it, in 1851, of thirteen acres near the river, which were added to the grounds of Queen's Cottage. For this piece of land a rent of £3 10s. per acre is still paid to the Department of Woods and Forests.

That all the changes wrought by the King and "Capability" Brown did not obtain universal approval is shown by the following lines from Mason's "Heroic Epistle to Sir William Chambers" (1773):

"Come then, prolific Art, and with thee bring
The charms that rise from thy exhaustless spring;
To RICHMOND come, for see untutored *Brown*
Destroys those wonders that were once thy own.
Lo! from his melon-ground the peasant slave
Has rudely rush'd and level'd *Merlin's Cave*,
Knocked down the *waxen wizard*, seized his wand,
Transform'd to lawns what late was fairy land;
And marr'd, with impious hand, each sweet design
Of *Stephen Duck* and good QUEEN CAROLINE!"

Before taking final leave of the Richmond Gardens of Queen Caroline, a few words may be devoted to the local worthy whose name is here coupled with hers. Stephen Duck was born in lowly circumstances, and for some years worked at Charlton, in Wiltshire, at a weekly wage of 4s. 6d. He spent what spare time he had in study and self-improvement, and when afterwards he came to Richmond to work in the Royal Gardens, the superiority of his talk and behaviour attracted Queen Caroline's notice. By her favour he studied for the Church, and was ultimately admitted to holy orders. He acquired a certain celebrity as keeper of Merlin's Cave, and as the author of a book of poems. At first attached to Kew Church, he was afterwards appointed to the living of Byfleet, near Weybridge. His ministrations at Kew, where his history was, of course, well known, are said to have drawn great crowds. Of his works a contemporary (Curll) ill-naturedly remarks that they had fallen to sixpence, "which is a groat more than they are worth.". Duck committed suicide, by drowning, at Reading in 1756.

The death of the mother of George III. (Augusta of Saxe-Gotha, Dowager Princess of Wales), in 1772, led to many important changes.

Demolition of Richmond Lodge. The King removed to his late mother's house at Kew and Richmond Lodge itself was rased to the ground. Every vestige of this famous house has vanished now, but judging from contemporary plans it stood about four hundred yards south of the present Queen's Cottage. Although the last remnants of the old antagonism between the Kew and Richmond establishments had passed away with the death of the old King in 1760, it was not until twelve years afterwards that one mind controlled the two properties. At this point, therefore, it is necessary to turn back and bring up the history of the Kew property to the same date, after which the two can be treated as one.



KEW HOUSE IN THE EIGHTEENTH CENTURY.

CHAPTER III

KEW HOUSE

It is in the middle years of the seventeenth century that we find first mention of Kew House, also known as "White House," the building which afterwards became the first of the three "palaces" of Kew, and in the grounds of which was formed the nucleus of the famous botanic gardens of later times. At that period it belonged to Richard Bennett, great-nephew of the Sir Thomas Bennett who was Lord Mayor of London in 1603. Subsequently it went to the Capel family through the marriage of Sir Henry (afterwards Lord) Capel with the daughter of Richard Bennett. Lady Capel died in 1721, and her memory is kept alive by a monument on the walls of Kew Church, the funds of which are still benefiting from the proceeds of property bequeathed to it by her. The family name, too, survives in the title of one of the private houses on the north side of Kew Green.

Sir Henry Capel was an ardent cultivator of plants, and to him may be fairly ascribed the genesis of Kew as a horticultural, if not a botanical, centre. John Evelyn, in his "Diary," makes several references to Sir Henry Capel and his gardens at Kew. In August, 1678, he wrote that the garden had the "choicest fruit of any in England," and that Sir Henry was "the most industrious and understanding in it." Five years later he alludes to his having seen there two greenhouses for oranges and myrtles. And under the date February 24th, 1688, he writes: "We went to Kew to visit Sir Henry Capel's, whose orangery and myrtetum are most beautiful and perfectly well kept. He was contriving very high palisades of reeds, to shade his oranges during the summer." Other evidences of the gardening enthusiasm of Sir Henry Capel are recorded. He imported several new fruits from France, and is said to have paid £40 for two lentiscus trees. J. Gibson, the author of "A Short Account of Several Gardens near

London," writing of the gardens of Kew House as he saw them in 1691, says that Sir Henry Capel "has four white striped hollies about four feet above their cases, kept round and regular, which cost him five pounds a tree this last year; and six laurustinuses he has, with large round equal heads, which are very flowery, and make a fine show. . . . His flowers and fruits are of the best." Sir Henry Capel, who ultimately became Lord Capel of Tewkesbury and Lord Deputy of Ireland, died in 1696. As he had no children, the Kew property descended to a grand-niece, Lady Elizabeth Capel, daughter of the second Earl of Essex. She married Mr. Samuel Molyneux, and came with her husband to reside at Kew House.

Mr. Molyneux, besides being a politician and secretary to the Prince of Wales (afterwards George II.), had a taste for astronomy.

Dr. Bradley. He converted the east wing of Kew House into an observatory and erected a telescope; and here it was, in 1725, that Dr. Bradley, subsequently Astronomer-Royal, made two important discoveries—the aberration of light and the nutation of the earth's axis. The sundial which now stands on the lawn in front of the present Kew Palace was erected there in 1832 by William IV. to commemorate these discoveries and to mark the spot on which they were made.

Mr. Molyneux died in 1728, and his death was followed, two years later, by that of his wife. It was then (1730) that Frederick, Prince of Wales, whose father, George II., had succeeded to the throne in 1727, obtained a lease of Kew House from the Capel family. Thus was inaugurated the long and intimate association of Kew with the Royal Family, which only ceased with the death of the Duke of Cambridge in 1904. Frederick, with the aid of Kent, the celebrated landscape gardener and architect, as soon as he had acquired Kew House, re-laid out its grounds and made additional plantings. He, however, died in 1751, and it is not to him but to his consort, Princess Augusta of Saxe-Gotha, that the honour of establishing a botanical centre at Kew is due. It had hitherto been held in high repute as a place where advanced and refined horticulture had long been practised. But it was not long now before it began, under the auspices of the Dowager Princess of Wales, to acquire a scientific character and reputation.

Whilst no particular date can be fixed on as marking the absolute beginning of Kew as a botanical garden, the year 1759 is notable

as witnessing the commencement of great activity there. It was in 1759 that William Aiton, the author of the great *Hortus Kewensis*, was engaged by the Princess Dowager of Wales to act as head-gardener; in 1759, Sir William Chambers began to embellish the gardens with the various temples and ornamental structures which are dealt with in some detail later, and several of which are still in existence; and about this time, also, John Stuart, third Earl of Bute, comes upon the scene.

Lord Bute had been a member of the Prince of Wales's household, and after the Prince's death he became the confidential adviser of the Princess Dowager, a relationship which, during the subsequent unpopularity of Lord Bute, was made the foundation of malicious insinuations. Soon after the accession of George III., in 1760, Lord Bute became Prime Minister. Whatever his virtues or failings as a politician and statesman may have been—and for a short time he was the best-hated man in Britain—he was a genuine lover of plants. Botany, in fact, appears to have been his chief relaxation. He was the author of one of the rarest of botanical books. Of this work, which was in nine volumes quarto, and was entitled “Botanical Tables, containing the Different Families of British Plants,” only twelve copies were prepared. As early as 1798 one of them was sold for £120. It was in pursuit of his favourite study that Lord Bute is said to have brought his life to a premature end. It is recorded that, seeing a plant which was new to him on the cliffs near Christchurch, Hampshire, he in climbing towards it “received a severe fall which brought on an illness of which he died” in 1792.

Of the early life of William Aiton, whose name, with that of his son William Townsend Aiton, fills so prominent a place in the annals of Kew for over eighty years (1759–1840), not much is known. What we know is based chiefly on a letter preserved in the library at Kew. From this we gather that he was born at Hamilton, in Lanarkshire, in 1731, that he came south in 1754, that he was employed in the Physic Garden at Chelsea under the famous Philip Miller, and that it was Miller who recommended him in 1759 to superintend the botanic garden at Kew.

Sir William Chambers was an eminent architect of his day, who is well remembered not only by his work at Kew, but still more generally as the architect of Somerset House. He was also a

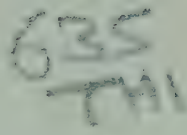
considerable traveller, having, among other countries, visited China. The knowledge he thereby acquired of foreign types of architecture was afterwards freely drawn upon to furnish ideas
Chambers.

for the structure and embellishment of the buildings he erected at Kew. In 1763, Chambers published a fine folio volume illustrated by engravings and diagrams, and containing descriptions of his work at Kew. From this volume several of our illustrations have been taken. He makes the following interesting allusion to the Kew Gardens of his time: "The gardens at Kew are not very large, nor is their situation by any means advantageous, as it is low and commands no prospects. Originally the ground was one continued dead flat: the soil was in general barren and without either wood or water. With so many disadvantages it was not easy to produce anything even tolerable in gardening: but princely munificence, guided by a director equally skilled in cultivating the earth and in the politer arts, overcame all difficulties. What was once a Desert is now an Eden."

Such, then, were the three chief helpers and advisers, each in his own way a remarkable man, whom the Princess Dowager of Wales had enlisted in her service in 1759. Chambers was an architect purely; Aiton was but twenty-eight years of age, and at first was probably responsible for cultural matters only; Lord Bute was the "principal manager," and supplied the scientific impetus. It is to him and to the Princess Augusta, whose generosity and liberal-mindedness were, of course, the moving powers, that the foundation of Kew as the botanical centre of the British Empire is due.

One other notable man deserves to be mentioned here. This is Sir John Hill, who in 1768 published the first *Hortus Kewensis*, containing a description of the exotic and rarer native plants cultivated in the garden. He was born at Peterborough about 1716 and, after carrying on a lucrative business as an apothecary in London, obtained a diploma of medicine from St. Andrews. He was the author of several works on botany, and a protégé of Lord Bute; through him, no doubt, as well as from inclination, he took a keen and friendly interest in Kew. His lengthy work, "The Vegetable System," the publication of which extended from 1759 until his death in 1775, appears to have led to his financial embarrassment, but brought him the knighthood of the Swedish order of Vasa. There is a curious pamphlet, entitled "An Address

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required at least once a week" there. From this it appears probable that he assisted in the laying out of the botanic garden in 1760.

George II. died in 1760, and, as already explained, with the accession of his grandson to the throne the long antagonism (or what remained of it) between the Royal households of Kew and Richmond came to an end. George III. reserved Richmond Lodge for his own use, whilst his mother continued to occupy Kew House. Her attachment to botanical and garden pursuits and to Kew was shared in no small degree by him.

According to Sir William Chambers, the formation of the botanic garden at Kew was commenced in 1760. The space allotted to the cultivation and scientific arrangement of the plants was originally about nine acres. This area was enclosed by walls, and the Temple of the Sun occupied the centre of the garden. One portion, called the Physic Garden, was devoted to herbaceous plants arranged in accordance with the then newly-devised Linnæan system. The other part was given up to trees and shrubs also scientifically arranged, and was called the Arboretum, a name for this part of the gardens which has survived until the present day among the older workmen. The large remainder of the Kew House demesne, which was termed the Pleasure Grounds, extended to the present southern limits of Kew Gardens near the Pagoda, having Love Lane as a western boundary and Kew Road as an eastern one. It covered an area, roughly trapeziform, some 1,600 yards long by from 300 to 500 yards wide.

In 1761 there was built the hothouse which afterwards became known as the "Great Stove." It was erected from the designs of Sir William Chambers, and was notable as being at that time the largest hothouse in England. Chambers describes it as 114 feet long, with the centre occupied by a "bark stove" 60 feet long. By "bark stove" is probably meant a bed of tan, in which the pots of plants were plunged and useful as giving off a mild, moist heat by fermentation. The house stood a little south of the Temple of the Sun, and was not demolished until 1861, having stood exactly a century. Its site is marked by the wistaria which is now trained on a circular iron cage, but which once grew on the walls of the old stove.

In the spring of 1762 the gardens at Kew were enriched by the removal from the Duke of Argyll's garden at Whitton, near Hounslow, of a large number of rare trees and shrubs. Most of them were probably



THE TEMPLE OF THE SUN.

planted in the Arboretum of that date—that is, the area adjacent to the Temple of the Sun. Here some of them still remain, such as the fine cedar of Lebanon, the Turkey oak, and, perhaps, the fine Persimmon and the old *Robinia Pseudacacia*.

During the next decade no event of importance is recorded, but these ten years saw, no doubt, a gradual improvement in the gardens, and an increase in the number of plants cultivated there.

Death of
Princess
Augusta.

In 1772, however, Princess Augusta died, and Kew lost thereby its generous founder. When her husband died in 1751, Kew had already acquired considerable prestige, and, in a horticultural sense, was probably not far from being the first garden in the country, but Kew, as she left it, had become one of the most notable scientific institutions in the world. Owing to the happy community of tastes between George III. and his mother, Kew suffered no neglect. The Princess died in February. Three months later the King and his family transferred their residence from Richmond Lodge to Kew House, and the freehold of the property was eventually bought by him from the Essex family.

The year 1772 is, in fact, a very important one in the annals of Kew. Besides the death of the Dowager Princess and the union

Sir Joseph
Banks, 1772.

under George III. of the Richmond and Kew properties (still separated, however, by Love Lane), it witnessed the retirement of Lord Bute from the botanical directorship of Kew and the installation of Sir Joseph Banks in his place. From now until 1819, when he is said to have paid his last visit to the garden, Banks remained virtually scientific director, although he never appears to have received monetary payment for his services or to have had official status. It was in 1772, also, that it was decided to send out from Kew the first of the long line of plant collectors, to whose exertions the gardens of Europe owe the introduction of so many exotic plants. The pioneer in this work was Francis Masson, who went to the Cape of Good Hope, whence he brought to Kew a great number of interesting and beautiful plants.

CHAPTER IV

KEW UNDER GEORGE III

At the period which we have now reached, when the Richmond and Kew Gardens both belonged to George III., the botanical section of Kew Gardens was being managed by William Aiton. John Haverfield. The Richmond Garden had, since 1760, been under the superintendence of John Haverfield, as also, it is probable, had that portion of the Kew demesne known as the Pleasure Grounds. The limits and duration of the respective charges of Aiton and Haverfield are now somewhat obscure, and several versions of the matter are extant. A grandson of Haverfield was curate of Kew from 1812 to 1818, and during the latter year officiated as Royal Chaplain there. In a letter published in *Leisure Hour* in 1862, he writes that his grandfather "was presented to the Princess of Wales by the Earl of Bute, and appointed by her superintendent of the Royal Gardens which were originally laid out by him." He also says that Aiton came to Kew as his grandfather's principal assistant. George III. made Aiton superintendent of the whole of Kew Gardens, whilst Haverfield, who was then well over seventy years of age, retained the management of Richmond Gardens until his death, at the age of ninety, October 29, 1784. He was succeeded in this position by his son, John Haverfield, junior, who kept it until his retirement about 1795. After that the administration of the two entire properties was vested in one person—the younger Aiton.

Soon after George III. took over Kew House and its grounds, there occurred an event, of minor importance certainly, but interesting because of the fame in after life of the person concerned. William Cobbett. This was the employment of William Cobbett—the famous Radical of later times and the author of "Rural Rides"—as an under-gardener at Kew. Cobbett himself says: "I had always been fond of beautiful gardens, and a gardener who had just come from the King's gardens at Kew gave me such a description



KEW GARDENS IN THE EIGHTEENTH CENTURY : GEORGE III.'S LAKE WITH SWAN BOAT.

of them as made me instantly resolve to work in these gardens. The next morning [Cobbett was then in his native town of Farnham] I set off with no clothes except those above my back, and with thirteen half-pence in my pocket. . . . The singularity of my dress, the simplicity of my manner, my confidence and lively air, and doubtless his own compassion besides, induced the gardener, who was a Scotsman [Aiton], to give me victuals, find me lodging, and set me to work. And it was during this period that I was at Kew that the present King [William IV.] laughed at the oddness of my dress while I was sweeping the grass-plot round the foot of the Pagoda."

From 1772 to the end of the century, the history of the Royal Gardens at Kew is concerned mainly with the sending out of plant collectors. Masson was sent to the Cape of Good Hope in 1772. Nelson was assistant botanist on Captain Cook's third voyage (1776-1779), and he was afterwards attached to the expedition to the South Seas under Captain Bligh. The object of this expedition was to introduce the bread-fruit to the West Indies, but, owing to a mutiny on board the *Bounty*, this object was not then accomplished. Nelson, remaining loyal to the captain, was cast adrift by the mutineers and eventually died through his hardships. Christopher Smith went with Bligh on a second voyage in 1791; this expedition was successful, and three hundred bread-fruit trees were introduced to Jamaica, where they were taken charge of by James Wiles, another gardener at Kew, who had accompanied Smith as assistant botanist.

The publication of the *Hortus Kewensis* by William Aiton marks the year 1789 as an important one in the annals of Kew. This work consisted of three octavo volumes, ornamented with thirteen coloured plates, and enumerated about 5,500 species. Of each species there is a brief description, and the date of its introduction is given. Aiton's *Hortus Kewensis* is the most important and most valuable work of reference in all that pertains to the introduction of exotic plants to Great Britain before 1789.

Four years later, on February 2nd, 1793, Aiton died. Although his life was not a very long or eventful one (he was only sixty-two years of age), his memory will always be kept green as the first botanical director of Kew, and as the author of the work just

referred to. How highly he was esteemed by his contemporaries is amply shown by the records of the time. He is buried in Kew churchyard, and at his funeral such noted men as Sir Joseph Banks, Dr. Goodenough (afterwards Bishop of Carlisle), Zoffany the painter, and Dr. Dryander, acted as pall-bearers. He was succeeded in his position at Kew by his son, William Townsend Aiton.

Among the many notable plants introduced to Kew during the last quarter of the eighteenth century was *Araucaria imbricata*, the now common "Chile pine," or "monkey puzzle," of our gardens. The credit of its first introduction belongs to Archibald Menzies, who accompanied Vancouver on his famous voyage of survey (1791-1795) as botanist and surgeon. The story is that Menzies and the other officers of the ship were dining with the Viceroy of Chile, and some nuts were brought in for dessert which were quite new to Menzies. Some of them he took on board ship and sowed in a box of earth. They grew and, as a reward for his keenness and trouble, Menzies had the satisfaction of landing five plants safely in England, and thus gained the honour of introducing to Europe a tree absolutely unlike any other then in cultivation, whose singular aspect makes it even now an object of wonder. Some of Menzies' five plants were sent to Kew, where one of them—a fine tree in its earlier days and the "lion of the gardens" as lately as 1840—survived until 1892. For several years previous to that date this tree had been gradually succumbing to the effects of smoke and fog, and had only been preserved for the sake of its historic interest. Its death of course necessitated its removal.

The remarkable *Strelitzia Reginæ* was introduced in 1773; *Nelumbium speciosum*, the "sacred bean," in 1787; *Fuchsia magellanica*, one of the parents of the garden fuchsia, and *Hydrangea hortensis* in 1788; *Pæonia Moutan*, the tree-pæony, and *Phormium tenax*, the New Zealand flax, in 1789.

The dawn of the nineteenth century saw no cessation in the activity of the administration of Kew. George III. and the Royal Family spent much of their time there; the Queen was attached to botany and horticulture; and the gardens continued to enjoy the valuable active support of Sir Joseph Banks, then at the height of his fame. Each of these factors no doubt supplied an invaluable stimulus towards their maintenance in a high state of

efficiency. This must, indeed, have been one of the most interesting periods in the annals of English horticulture. The labours of the earlier collectors were bearing full fruit, especially those of Masson in South Africa. The Cape heaths alone must have constituted at that time a collection which in extent and variety has not since been surpassed.

It was at this period, too, that active efforts were made to introduce plants from the southern coasts of Australia, a region peculiarly rich in striking and ornamental greenhouse plants. A commencement had been made by Menzies, who, as we have already seen, was attached to the surveying expedition under Vancouver (1791-1795), and who was the first to introduce Australian plants to Kew. Peter Good, however, a gardener at Kew, was the first collector sent to Australia from this establishment. He was appointed under Robert Brown, the celebrated botanist, to accompany Flinders on his voyage of survey of the Australian coast (1801-1803). Good worked actively on the south-western coasts until his untimely death from fever in 1803. The large quantity of seeds he had collected was duly received at Kew, and became the main source of the fine assemblage of proteaceous plants which Kew subsequently possessed. Another collector, George Caley, went out about the same time under the auspices of Kew and Sir Joseph Banks. He collected chiefly in the rich country about Sydney and the Blue Mountains, and remained in New South Wales until 1811.

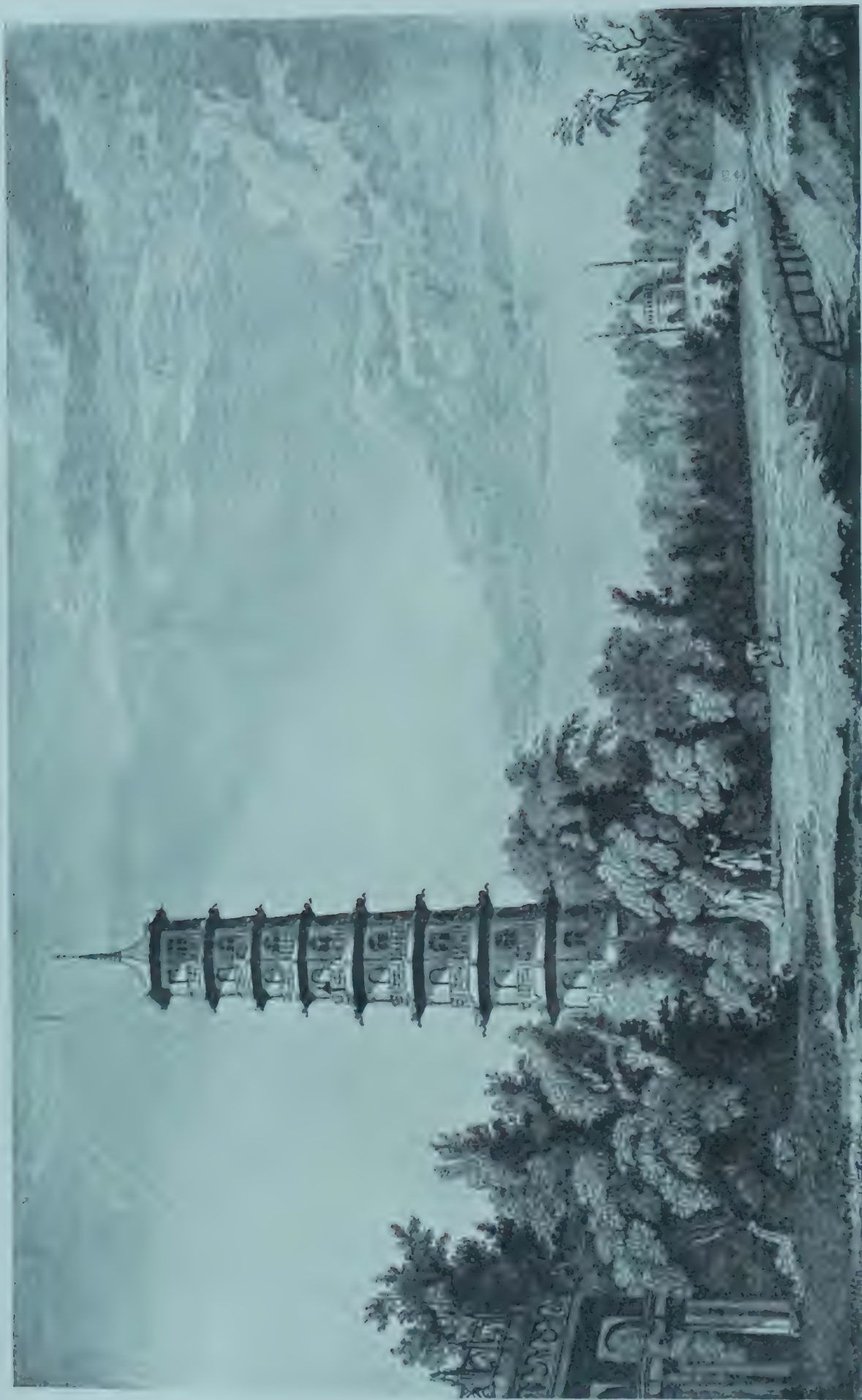
After Caley had returned home, Kew was without a direct representative in Australia until 1817. In that year, one of the most famous of all plant collectors, Allan Cunningham, joined an expedition whose object was to explore the Lachlan and Macquarie Rivers. He subsequently visited New Zealand and Norfolk Island, and from all these places introduced a great number of beautiful new plants. But Cunningham had had previous experience in plant-collecting. In October, 1814, he sailed for Brazil with another Kew gardener, James Bowie, with whom he spent two years in this work. Then they separated, Cunningham going to Australia to make further researches, whilst Bowie was sent to the Cape of Good Hope, where he resumed the work of Masson and carried it on until 1823. During five or six years of active work, Bowie introduced many valuable plants, especially

bulbs and succulent plants. *Clivia nobilis*, one of the most popular South African plants at the present time, was introduced by him. He also brought home the remarkable cycad, *Encephalartos horridus*.

It is, however, anticipating matters somewhat to discuss here the work of Cunningham and Bowie. The next collector after Caley in point of time was William Ker. South Africa and Australia had already been visited by collectors for Kew, William Ker, 1803. and China was the next field which the authorities at Kew decided to draw upon for the enrichment of their collections. Ker, a young Scotch gardener then in their employ, was accordingly despatched to that country in 1803. He was successful in introducing a number of valuable plants, amongst which the most popular to-day is the Tiger lily. The well-known hardy shrub, *Kerria japonica* (double-flowered form), was introduced by Ker and subsequently named after him.

The introduction of new plants from foreign countries is the most interesting feature in the history of Kew from the early years of the nineteenth century to its transference to public control in 1840. Always a work of the utmost importance, collecting New Plants. must, in those days of sailing-ships and long, slow journeys, have been supremely interesting as well. We who live a century later have, perhaps, become somewhat *blasé* in our attitude towards the introduction of new plants. For the fact is the world has been pretty well ransacked by this time, and although many species of plants doubtless have yet to be discovered, they must all—or nearly all—belong to types already well known. At the beginning of the nineteenth century the floral treasures of great areas of the globe were still not only ungathered but unknown. All Africa, saving its northern and southern extremes, almost the whole of Asia, the two Americas, with the exception of the eastern seaboard of the north—all these remained practically virgin fields, open to the plant collector. One hundred years ago every packet of seeds received at Kew from its collectors abroad carried within it the possibility of some vegetable wonder which untravelled European eyes had never seen before.

The first decade of last century, whilst it saw Kew at the zenith of its fame and activity, saw also the commencement of its decline. The shadow which fell upon the King's mind in 1801 deepened as the years went on, and in 1810 his reason permanently left



KEW GARDENS IN THE EIGHTEENTH CENTURY : PAGODA, ALHAMBRA, AND MOSQUE.

him. Although he had intended making Kew a place of frequent residence, as is shown by the erection of the New Palace in 1803, he does not appear to have visited it after 1806. For over thirty years it had been his favourite summer resort. **Kew's Decline.** The Queen, no doubt, retained a genuine affection for the place, but she, too, was now growing old. Kew, at any rate, had by 1810 entered upon its decadent period. As Sir William Thiselton-Dyer has written, "from this time, for the next thirty years, Kew undoubtedly, though with some spasmodic efforts at recovery, went steadily downhill."

The Prince of Wales (afterwards George IV.) was made Regent in 1811, and apparently found Brighton more to his taste than the semi-rural charms which had attracted his parents to Kew. **The Prince Regent, 1811.** The withdrawal of Royal interest was no doubt the primary cause of Kew's decline, but the science of botany seems at that time to have suffered a partial eclipse owing to "a new science, Chemistry, which sprang rapidly into notice." Sir Humphry Davy, then at the height of his career, by his lectures and demonstrations at the Royal Institution made that science "pre-eminently popular and fashionable; so much so, that it cast botany for a while in the shade." The gathering of the allied sovereigns in London after Waterloo is said to have been the cause of a renewed interest in Kew. "The imperial and royal guests put in many applications for specimens of this then unique collection of plants, and the Prince [Regent] delighted in gratifying their wishes; and an active intercourse with the managers of foreign gardens, and with scientific men, was for a while resumed" (Scheer).

In 1816 a gardener at Kew named Lockhart joined the expedition under Captain Tuckey to the river Congo. This expedition, which penetrated to the Yellala Falls, had a disastrous ending. **Congo Expedition.** Twenty-one out of the fifty-four persons belonging to it died. One of them was Professor Smith, the botanist of the expedition, under whom Lockhart served; Captain Tuckey was another. Lockhart, however, escaped, although it is recorded that he was the only survivor of the party who explored the river above the Falls. He lived to do useful work in the West Indies, where he died in 1845. From 1816 until 1835 no other collector was sent out directly from Kew. After Lockhart's return the establishment

was dependent on the good offices of interested friends, and on the voluntary work of such of its *alumni* as were stationed abroad.

With the death of Queen Charlotte in Kew Palace on November 17th, 1818, and the subsequent closing of the building, Kew no longer

remained a place of residence of the reigning monarch.
Death of George III. and his Queen. George III. had not himself occupied the house since 1806, but his Queen and family had occasionally stayed there. Now, however, the garden lost that close interest which their presence on the spot had naturally

gained for it. The King died in 1820, but as he had for some years lived at Windsor, nearly blind and wholly insane, his death had but little influence on the fortunes of Kew. Of more immediate concern to it was the death of Sir Joseph Banks in the same year. Kew was thereby robbed of its most important and influential friend. Without possessing any official position, he had for nearly fifty years been the chief adviser of successive members of the Royal Family in matters relating to Kew. Much of its fame and efficiency in the last years of the eighteenth century and the early ones of the nineteenth must be ascribed to him.

CHAPTER V

KEW FROM 1820 TO 1841

KEW in 1820 was but one of several places under the direction of the younger Aiton, and it suffered, no doubt, from the lack of that personal and undivided supervision which a scientific John Smith. collection of living plants—more, perhaps, than any other—needs. Contemporary accounts of the gardens from this date onwards are frequently anything but flattering to their management and condition. How much of this was due to financial stringency and how much to a lack of initiative and energy, we cannot at this date determine. In 1822 there entered the Kew service a young man destined to occupy an important place in the establishment. This was John Smith, a Scotsman, afterwards first curator of the gardens. He was a native of Aberdour, in Fife, and was born in 1795. In 1826 he was made Aiton's chief assistant in the Botanic Garden and, soon after the gardens became public property in 1840, was appointed curator to serve under Sir William Hooker. The twenty-one years between the death of George III. and 1841 saw Kew at its lowest ebb, and the existence of what remained of a genuinely scientific character in the establishment was largely due to Smith's industry and enthusiasm for plants and botany. During the reign of George IV. no more collectors were despatched from Kew, although plants and seeds were occasionally received from men who had gone abroad from Kew on other accounts. The maintenance of the collections, therefore, depended mainly on keeping alive the plants already existing there; in other words, on cultural skill—a factor in the success of botanical gardening whose importance has rarely been properly appreciated.

George IV. at one time took some interest in Kew, and for a short period even contemplated building a new palace there. With this laudable aim he effected a change in the boundaries of the gardens

which proved of great value in after years. By Act of Parliament he was in 1823 empowered to add to the gardens the long, narrow angle of Kew Green, which at that time ran to a point near Kew Palace. Thereby he extended the boundary of the Royal property to where the present low iron fence runs across the Green close to the director's official residence. The right of way which had hitherto given the public access from the village of Kew to Brentford Ferry, past Kew Palace, was diverted to the present roadway along the riverside. As compensation to the residents, the Crown took over the maintenance of the parish roads. This duty, however, was afterwards transferred to the local authorities, the cost being met by an annual payment to them by Government. The result of the annexation of this portion of Kew Green was that the two Royal properties—the grounds belonging to Hunter House (the present Herbarium) and Kew Gardens proper—became united. The new boundary between the Royal property and Kew Green was defined by a tall iron railing, in the centre of which were gates crowned with a lion and unicorn couchant. They now ornament (and give the names to) the Lion Gate and the Unicorn Gate respectively, both in Kew Road.

By the addition of this portion of Kew Green and the previous purchase of various properties on the south side of Kew Green, the Royal Botanic Garden of 1760 had been about doubled in size. And at these dimensions it remained until the early 'forties, and the advent of Sir William Hooker. The Botanic Garden still remained distinct from the Pleasure Grounds, although both were under the direction of W. T. Aiton. Several of the brick walls of the gardens originally attached to the houses on the south side of Kew Green, as well as others, still stood, and converted this portion of the grounds into a series of enclosures. The first of these walls to be removed ran from the old "Ice House" to the east end of the present No. III. Museum. It was pulled down during the reign of William IV. At the present time none of them remains, except the west wall of the Herb Garden and that which encloses the garden of Cambridge Cottage.

After the death of Sir Joseph Banks in 1820, his position in relation to the Botanic Garden at Kew appears to have been to some extent assumed by Sir Everard Home, although neither was Home's

place in the scientific world equal to Sir Joseph's, nor was the condition of things that obtained at Kew at all similar. What

Sir Everard Home. we know of Home's connection with Kew is chiefly due to the local author, Scheer. Writing in 1840, when

the fate of Kew Gardens hung in the balance, he says in regard to the temporary residence of Mr. A. B. Lambert (a well-known authority on conifers) in the village: "He recalled the best days of Sir Everard Home, who for some length of time used to meet here, almost every Saturday, at Mr. Bauer's, many of the eminent men of the day, for purposes connected with Botany and other branches of Natural Philosophy, and a friendly and social intercourse. Had some one of our chief inhabitants pursued a similar system [after Home's death in 1831], the world would have been spared the pain of ever discussing the possibility of closing our gardens."

It will be convenient to give some brief mention of the famous artist whose name occurs incidentally in the extract which has just

Francis Bauer. been quoted. Francis Bauer was born at Felsberg, in Austria, in 1758. At the age of thirty he came to England, and in 1790 settled at Kew. His connection with the

Botanic Garden, to which he was attached as draughtsman, affords a striking instance of Sir Joseph Banks's liberality towards Kew. Not only did he pay Bauer's salary up to his own death in 1820, but in his will made such provision for the artist as to "place him in a position of moderate independence, enabling him to pursue through life the bent of his genius unshackled by the caprice of the public and independent of booksellers and critics" (Scheer). Bauer stands in the very first rank of botanical artists, securing, as but few flower painters have been able to do, the exactness and detail required by science, without sacrificing a truly artistic presentation of his subject. In the more mechanical art of microscopical drawing he is said, in his time, to have been unrivalled. He lived at Kew in a house near the Pond in the north-eastern corner of the Green, and died there on December 11th, 1840, in his eighty-third year. He had known and worked for Kew in the palmy days of the late eighteenth century and during its decline; and although he did not live long enough to behold its resuscitation under Sir William Hooker, a hopeful future was already dawning before he died.

Although William IV. is said to have taken a warm interest in the place where so many of his younger days had been spent, his

accession to the throne in 1830, and his consequent ownership of Kew, did nothing to awaken the establishment from the lethargy which, in a scientific sense, had overtaken it. A few **William IV.** changes were effected, however, and some additions made to the features of the garden during his short reign. The present No. 1 House, standing close to the chief entrance, and now devoted to the cultivation of tropical aroids, etc., was removed to its present site from Buckingham Palace in 1836. At first it did duty for the Palm House, which had long been projected but was not built until 1848. The structure known as King William's Temple was also built towards the close of this reign.

We have now reached the time when the fortunes of Kew had sunk to the lowest degree. William IV. died in 1837, and the young Queen had no personal associations with the place. Soon **Kew in its** the Botanic Garden began to be regarded as little more **Decadence.** than an incubus on the Royal purse. Yet, with all its shortcomings, Kew still possessed a very extensive collection of plants. Of Australian—or, as they were then called, New Holland—plants, it contained by far the richest collection in existence. It was, no doubt, hampered by want of adequate funds, but what was still more lacking was a vigorous and intelligent management. Remedied in these respects, public interest and appreciation might have compensated for the absence of immediate Royal interest. But the Kew of 1837 had apparently succumbed to that peculiar listlessness or even lethargy to which botanic gardens appear to be particularly subject.

King William died on June 20th, 1837, and in January of the following year a committee of three persons was appointed “to inquire into the management, etc., of the Royal Gardens.” **Committee** Of this committee the leading spirit was Dr. John **of Inquiry,** Lindley, a notable botanist of his time, and a man **1838.** well conversant with horticultural matters through his connection with the Horticultural Society. His colleagues were Mr. (afterwards Sir Joseph) Paxton, and Mr. Wilson, gardener to the Earl of Surrey. They visited the gardens in February, 1838, and presented their report in the same month. There is no month in the twelve so unsuited for the inspection of a garden as February, especially a February like that of 1838, which had followed one of the worst winters on record. Herbaceous plants are still underground; deciduous trees and shrubs are leafless; and in the glass-houses the



THE AZALEA GARDEN

full effects of the winter are showing themselves, whilst it is yet too early for the rejuvenating influences of spring to become evident. In February, 1838, heaps of snow were still lying about the grounds.

The report of Lindley and his colleagues, therefore, did not present any too favourable an account of the condition of things at

Lindley's Report. Kew. Lindley was a man of singular energy and purpose, with a gift for incisive phrasing; and the proofs of neglect, the want of system that was apparent, and what appeared to him the illiberal and selfish manner in which the place had been conducted, all offended his energetic mind, and afforded him abundant material to animadvert upon. On the whole, the report may be described as doing no more than bare justice to any department of Kew, whilst it represented some departments as being in a worse condition than they really were. Without reflecting on Lindley's judicial capacity, evidence is not wanting to show that he had made up his mind in regard to the place before ever he visited it in his official character.

But, after all, the portion of the report presented by Lindley and his colleagues which dealt with the condition of the gardens

Lindley's Recommendations. in 1838 was really its least important feature. Lindley did not hesitate to point out the benefits to the community at large which might be derived

from a well-managed, well-equipped botanic garden; how medicine, manufactures, and horticulture might be helped by the existence of a central establishment to which useful and ornamental plants might be sent and redistributed; how a taste for refined horticulture might thereby be fostered; and how such a garden might be relied on by Government to supply authentic information in regard to the economic development of new colonies. He also pointed out that England, "the wealthiest and most civilised country in Europe," was "the only European example of the want of one of the first proofs of wealth and civilisation."

Lindley's report, although its purport had become widely known, was not presented to Parliament until May 12th, 1840. In the mean-

Lord Surrey and Kew. time, the existence of Kew as a scientific establishment came perilously near to an end. Besides the Botanic

Garden proper and the Pleasure Grounds, Kew had at this time a kitchen garden, as well as some fruit and forcing houses. The private yard near the curator's office, in which the propagating

houses are now situated, still retains its old name of "Melon Yard." In 1839, Lord Surrey—who, as Lord Steward, had then control of Kew—evidently made up his mind to develop the strictly utilitarian side of the establishment to the detriment of that which was botanical. For the purpose of arranging matters, he paid frequent visits to the Botanic Garden, "always accompanied by the kitchen gardener." John Smith, then foreman of the Botanic Garden, who, we can well imagine, watched their peregrinations with no amiable eye, gives the following account of this episode in his "Records of Kew":—"It became known that it was Lord Surrey's intention to convert the greenhouses and pits [of the Botanic Garden] into vineries and pine-stoves, and that the plants had been offered to the Horticultural Society for their garden at Chiswick, and also to the Royal Botanic Society at Regent's Park; but the offer was in both cases declined. The vinery scheme was, however, intended to be carried out, and on February 18th, 1840, the kitchen gardener informed me that he had received instructions from Lord Surrey to take possession of the Botany Bay House and convert it as soon as possible into a vinery, and that the Cape House was to follow; and to enable him to do so he had to destroy the plants. This becoming known to the public, led to articles in the public journals, condemning the scheme as being a disgrace to the nation. This had the desired effect, and Lord Surrey's scheme was abandoned."

Kew has hardly ever lacked, since its foundation in 1760, powerful friends at Court and disinterested helpers in every section of the community. The science of botany allied to the art of horticulture is so fascinating, and attracts so general a sympathy, that one would scarcely expect it otherwise. First among the helpers in point of time were Lord Bute and Sir Joseph Banks, and now, eighty years afterwards, at the most critical stage of its history, it had an unobtrusive but potent friend in John, sixth Duke of Bedford. The Duke was an ardent lover and patron of botany, and cultivated in his gardens at Woburn large collections of plants, scientifically arranged and named. Under his direction several valuable works were published, most notable of which was a monograph on willows. He had for many years hoped to see Kew transformed into an establishment worthy of the country, and now that Lindley's report had awakened the public to the national advantages of a properly organised botanic

garden, he exerted his enormous influence towards the accomplishment of that end. For many years he had known Sir William Hooker, at that time Professor of Botany in Glasgow University, and admired his scientific attainments, his energy, and his personal character. Knowing, too, his ambition to direct the fortunes of a new and regenerated Kew, and recognising in him the man best fitted for the position, he sedulously worked in his favour. Unfortunately, the Duke, dying in October, 1839, did not live to see the fulfilment of his hopes in regard to Kew and Sir William Hooker.

On March 3rd, 1840, the Earl of Aberdeen brought up the question of Kew in the House of Lords. He said "he considered the Botanic Gardens to constitute a part of the state and dignity of the Crown, which should by no means be separated from it. So far from desiring to destroy this establishment, he should think her Majesty could not favour a better object than the protection, encouragement, and cultivation of that delightful science with which the gardens were connected." He then asked if there was any truth in the reports that the Government intended to abandon and destroy this establishment. In reply, Viscount Duncannon said that there was not and never had been the least intention to break up the gardens. To one unaccustomed to the peculiarities of official replies in Parliament, this statement, in view of Lord Surrey's proceedings at Kew, might have appeared a rather remarkable one. However, the continued existence of Kew as a botanic garden was assured. That was the great thing. Eight days after this discussion, a minute was issued from the Board of Green Cloth announcing the transference of the control of Kew from the Lord Steward to the Commissioners of Woods and Forests, and directing that "possession of all the said gardens, except the kitchen garden, be given to such person or persons as the Chief Commissioners may duly authorise to take charge of the same," from April 1st, 1840.

At this time W. T. Aiton was seventy-four years of age and, having succeeded his father in 1793, had had charge of the Botanic Garden for forty-seven years. In the autumn of 1840 he announced his intention of resigning this portion of his duties, still, however, retaining charge of the kitchen garden and Pleasure Grounds. Meanwhile, the appointment of his successor had not been settled, and it was not until March, 1841,

Debate in
the House
of Lords.

Sir William
Hooker.

that Sir William Hooker was officially selected. It must have been obvious to Hooker that his transference from Glasgow to Kew would bring him no material benefit. As a matter of fact, his salary at the commencement was but £300 a year, with £200 in lieu of a residence. But in his fine ambition to become the director of England's first really national garden, monetary considerations did not weigh with him. We have it on the authority of his son, Sir Joseph Hooker, that the removal of his herbarium, library, and other effects from Glasgow to Kew cost him his first year's salary. His claims had been strongly supported by the new Duke of Bedford, the Duke's brother Lord John Russell (then in the Ministry), and Mr. Spring Rice, Chancellor of the Exchequer, but soon afterwards Lord Monteagle.

Kew had now successfully weathered the severest crisis in its history. Although it had to encounter official indifference, more especially on the part of Lord Duncannon, the Chief Commissioner, who objected to any increase of expense or to any extension of the gardens, it had many staunch supporters. However cramped its resources for the present, it stood on the threshold of a new and hopeful career, and none had a surer confidence in its future than the new director.

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HOLLYHOCKS AND THE CAMPANILE

CHAPTER VI

SIR WILLIAM HOOKER, 1841 TO 1850

BEFORE entering on a detailed account of events at Kew subsequent to 1841, a few words should be devoted to the remarkable man upon whom the guidance of its fortunes now devolved. William Jackson Hooker came of an old Devonshire family, but was born at Norwich, on July 6th, 1785. At the time, therefore, when he undertook the directorship of Kew, he was nearly fifty-six years of age; and it bears no small testimony to his vigour and energy that he should have accepted such an office at a time of life when most men do not desire to increase their responsibilities.

He was educated in the Grammar School at Norwich, and from his early years was attached to the study of natural history, more especially of birds and insects. Later, he turned to Hooker's botany, and in his twentieth year first discovered in Genius. Britain the remarkable moss, *Buxbaumia aphylla*. He was elected a Fellow of the Linnean Society at twenty-one years of age. In 1815 he married Miss Turner, and for some time after that event had a large interest in, and the management of, a brewery at Halesworth in Suffolk. This business, however, which proved neither congenial to his tastes nor particularly successful, he relinquished in 1820. By this time his scientific pursuits (for he was already an assiduous collector and author) had gained him an extensive acquaintance with the leading naturalists of the day. On the recommendation of the most influential of these—Sir Joseph Banks—he was appointed to the Chair of Botany in Glasgow University. His career as a lecturer there was a remarkably successful one. Not only was the charm of his eloquence greatly enhanced by his fine voice and handsome presence, but the solid attributes of knowledge and earnestness were apparent to all his students. He was knighted by William IV. in 1836, and retained his professorship at Glasgow until his transference to Kew in 1841. The great need

of Kew in 1841 was the direction of a man gifted with energy, enthusiasm and, above all, imagination. How much Hooker had of the two former is shown by what he accomplished. How amply he was endowed with the last is strikingly demonstrated by the Kew of the twentieth century; for, if we except the North Gallery and the Jodrell Laboratory, there is scarcely a notable feature or branch of activity in the establishment to-day which was not originated or at least foreshadowed by him. When he began his rule, Kew was a comparatively small affair, but he never let his vision pass from the nobler Kew of his imagination, nor his efforts relax in its achievement.

When Sir William Hooker became director of Kew it was under the control of the Commissioners of Woods and Forests, and it was, perhaps, a stroke of good fortune that Lord Lincoln, afterwards Duke of Newcastle, became Chief Commissioner in place of the unsympathetic Lord Duncannon. The new director was not only given a free hand, but received help and encouragement also from the new Chief Commissioner and several of his colleagues. Mr. John Smith, who for many years had been foreman of the Botanic Garden under W. T. Aiton, was appointed curator.

At this time Hooker's charge was comprised in an area of about fifteen acres, divided, as we have already seen, by a number of brick walls, which must have prevented the production of any broad landscape effects. One of his first improvements was the gradual removal of most of these walls.

**Kew Gardens
in 1841.**

According to Lindley's report, there were, in 1841, ten glass-houses in the Botanic Garden, besides the usual pits and frames. Six of these were stoves and greenhouses, from 40 feet to 60 feet in length; two were respectively 30 feet and 35 feet long; and there were still in existence also the "Great Stove," 114 feet long, built by Sir William Chambers in 1761 (alluded to on an earlier page), as well as a "Botany Bay" house of about the same length, built in 1788. These houses are described as having been much crowded with plants, and no doubt the heating arrangements of several of them were well out-of-date. Reform was begun at once by renewing and enlarging the glass-house section of the establishment, and, where possible, bringing the heating arrangements more into line with the approved methods of the time.

A step which at once placed the establishment on a popular basis was the opening of the gardens and glass-houses to the public every week-day, from one to six in summer and to sunset in winter.

Admission of the Public. This was a new and at the time was thought to be a hazardous experiment, for although in Aiton's time the public had been admitted, they were always kept under supervision. It was, however, found, as in later times when the numbers had increased a hundredfold, that little or no harm was done. During the first year (1841) the gardens were visited by 9,174 persons, among whom were many who justified the liberal policy of the director by becoming (as he himself records) interested friends and contributors to the institution.

The influx of new plants into the gardens in these early years was so great as to become embarrassing in view of the restricted means of accommodating them which then existed. As an indication of the spirit engendered in the horticultural world by the new Kew, it may be mentioned that the Royal Horticultural Society passed a resolution that henceforth the seeds and plants received from their collectors abroad should, as they arrived, be divided with the Botanic Garden at Kew. The Queen and Prince Consort became interested in, and sent gifts to, the establishment. The Duke of Bedford's entire collection of orchids at Woburn was given to the Queen for Kew. The leading nurserymen evinced a spirit of great generosity towards the place, as, indeed, they have always done.

Nor was it at home alone that Kew found generous friends. There was scarcely any region in the globe where British subjects were stationed that was not drawn upon to enrich its collections. Dr. (afterwards Sir Joseph) Hooker, who in 1839 had accompanied Sir James Clark Ross on his Antarctic expedition in the *Erebus*, sent home many plants from regions then little known. Notable among these plants were the remarkable beeches of Tierra del Fuego. There was scarcely a tropical plant of note which, if not already there, did not soon find its way to Kew. In Sir William Hooker's first report (1844), he mentions as existing, among a multitude of others, such famous plants as bread-fruit, yam, rice, coffee, tea, sugar, cocoa, pepper, nutmeg, allspice, clove, ginger, ipecacuanha, cotton, teak, mahogany, and the Upas tree.

After the death of Sir Joseph Banks, in 1820, no further plant-collectors had been sent out from Kew, with the exception of George Barclay, who in 1835 went to Western South America and several of the Pacific Islands in H.M.S. *Sulphur* as botanical collector. But, in 1843, Sir William Hooker made an arrangement with the Duke of Northumberland and the Earl of Derby by which the cost of sending out two collectors was shared by them and Kew. In virtue of this arrangement two plant-collectors were despatched—Purdie to New Granada and Burke to North-West America. The seeds and plants they sent home were apportioned between the three contributors to the enterprise. Purdie and Burke were recalled in 1845, the former being appointed superintendent of the Botanic Garden at Trinidad. But whilst Kew was receiving so extensively from establishments at home and abroad, the credit side of the account was not overlooked. The governors, directors of gardens, and other officials in the colonies were freely supplied with plants new to, and likely to be valuable in, their respective territories. Among the first things distributed wherever opportunity offered a likelihood of success were the finer varieties of oranges and bananas, and the cochineal cactus. Thus was begun a work recommended in Lindley's report, which has always been vigorously carried on since that time, and which has conferred inestimable advantages on the Empire.

A new Orchid House was built in 1845, the immediate object being to house the fine collection of plants which had come from Woburn. In 1846 they were reinforced by the Broughton Hall collection, bequeathed to Kew by the Rev. J. Clowes. The Tropical Fern House of to-day is the Orchid House of 1845, much altered and improved.

Sir William Hooker's activity showed itself as much in the grounds as in the stoves and greenhouses. In 1842 a portion of the private grounds of Queen Victoria adjoining Kew Green was granted by her Majesty for the purpose of making a new entrance. Hitherto, access to the gardens had been obtained by way of a narrow, obscure passage on Kew Green, the entry to which was where the fire-engine house is now. Mr. Decimus Burton, F.R.S., was commissioned to design the new gates. The result was an auspicious beginning for the new *régime*, for the noble gates and pillars which constitute what is now known

New Main
Entrance.

as the Main Entrance are universally recognised as a masterpiece of design. The gates were constructed by Walker, of York, and erected in 1845.

A much larger addition was made to Sir William Hooker's charge in 1843. A portion of the Pleasure Grounds, forty-five acres in extent and adjoining the old Botanic Garden (which still covered less than twenty acres), was granted by the Queen for the purpose of affording more space for arboriculture and a site for the long projected Palm House. This more than trebled the extent of the Botanic Garden.

Two years later (1845) an event took place which was far-reaching in its influence on the future development of Kew. On July 9th of that year the management of the Pleasure Grounds, then considerably over 200 acres in extent, was relinquished by W. T. Aiton and handed over to Sir William Hooker. At that time this portion of Kew was the private property of the Crown, partly a game preserve, partly meadow, and partly arable land. Many portions were beautifully wooded, but absolutely nothing existed in the way of a botanical arrangement of trees and shrubs. Soon after the transfer, however, it was determined that this extensive area should be utilised for the formation of a national arboretum.

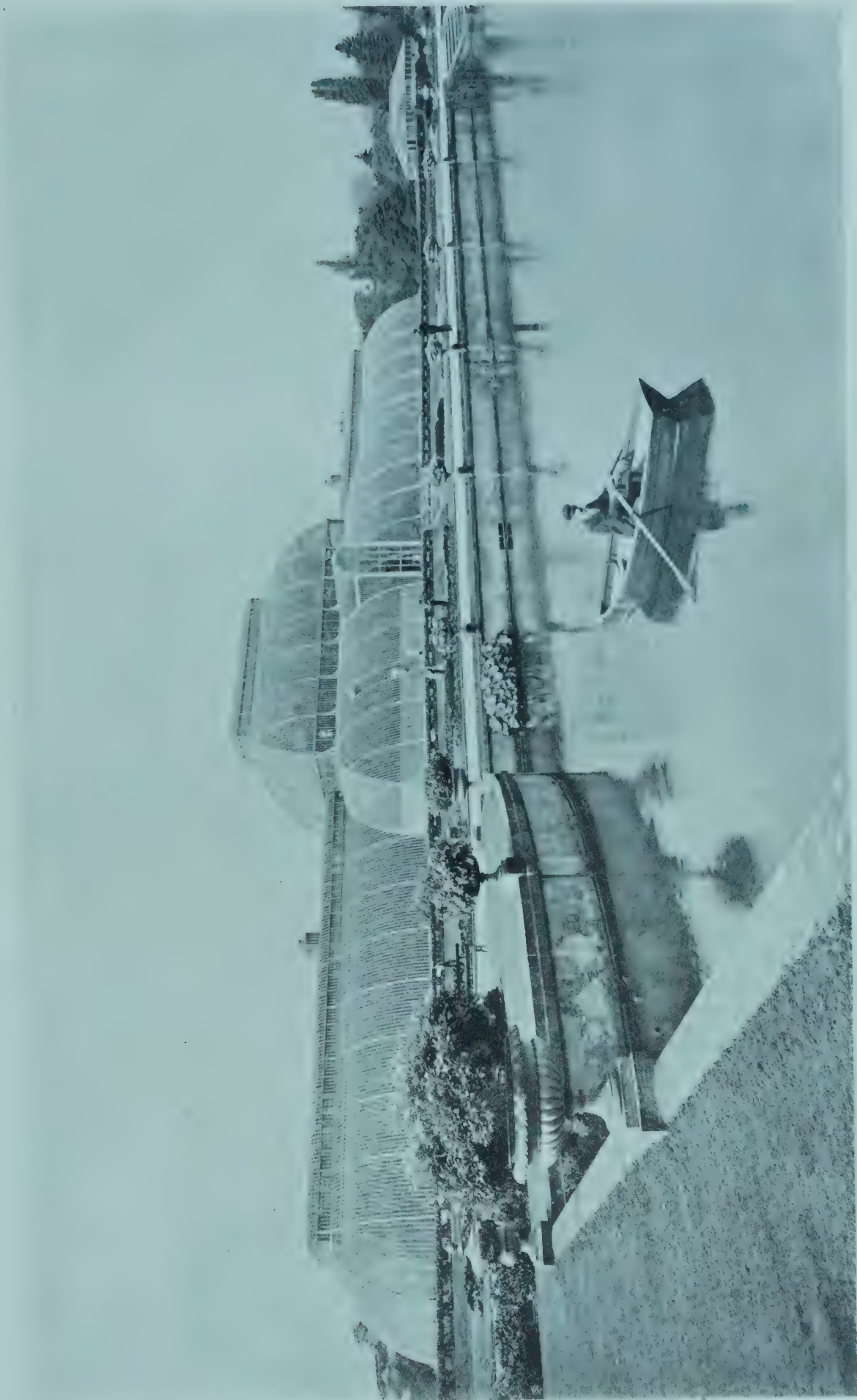
In the laying out of this, together with the recent additions to the Botanic Garden, the advice of a professional landscape gardener was thought to be desirable. Thus was brought W. A. Nesfield. about the connection between Kew and Mr. W. A. Nesfield, the leading practitioner of that date.

It has to be remembered that in 1845 the Pleasure Grounds, so far as the general public was concerned, were a thing apart from the Botanic Garden. An unclimbable fence, partly iron, partly ha-ha, stretched in a rough semicircle from the present Unicorn Gate to a point about fifty yards west of the large Turkey oak that stands near the Broad Walk. It then ran parallel to this walk as far as the private grounds of Kew Palace. The union of the Botanic Garden with the Pleasure Grounds under one authority at that date had an indisputable advantage. It enabled the designer to treat the entire area as a whole, and thus anticipate future developments. And so well was the general disposition of the main walks and avenues conceived, that little alteration in them has taken place up to the present time.

In 1847 the Pleasure Grounds were opened to the public every Sunday and Thursday from Midsummer to Michaelmas, and were visited by nearly 39,000 people. At that period they were only accessible by two gates opening from the Kew Pleasure Grounds. Road, and one near Brentford Ferry. There was no direct communication for visitors between them and the Botanic Garden. This inconvenience was afterwards remedied, and several entrances were made in the boundary fence. The number of days on which the Pleasure Grounds were open to the public was gradually increased, until, from March 30th, 1864, they were, like the Botanic Garden, open every day of the year except Christmas Day. These two sections of the grounds at Kew were divided by the fence until 1895. In the spring of that year its removal obliterated at once the boundary line and the distinction between them.

In 1844 the erection of the great Palm House designed by Decimus Burton was begun. The work occupied about four years, and its completion marks an epoch in the history of New Palm House. glass-house gardening, for the Palm Stove at Kew long remained the largest plant-house in existence. The site on which it stands is admirably adapted for displaying its fine proportions, but it has the disadvantage of being the lowest part of Kew, a spot at one time covered with water. As has been said: "Palm trees now grow where painted Britons were wont to snare water-fowl." The percolation of water through the walls of the underground chambers in which the furnaces and boilers are situated has been a source of great trouble. In the early days the extinction of the fires was at times only prevented by long-continued pumping. In later years this evil has been diminished by encasing the walls with waterproof material, and relaying the floors on a bed of concrete and puddled clay.

To avoid the unsightliness of chimneys rising out of the building, an underground flue, or tunnel, was made to convey the smoke to the tower which stands some 150 yards to the south-east. The tunnel was also designed to afford a way by which fuel could be taken to the furnaces. This latter purpose it still serves, but as a vent for smoke it proved unsatisfactory, and two chimneys—one in the centre of each wing—were eventually built, the tops of which stand but little above the lantern.



THE PALM HOUSE.

Near the summit of the tower a reservoir for water was constructed. This was originally intended to afford sufficient pressure for the tallest palms to be watered overhead. The supply of water to the Palm House was subsequently incorporated in the elaborate system which now supplies the whole of the buildings, plant-houses and grounds. The reservoir on the tower is, however, still used as a reserve during repairs, etc. This handsome tower, built on the lines of an Italian campanile, is 107 feet high, and is one of the most pleasing architectural features of Kew.

When once the site of the Palm House had been settled upon and its erection commenced, Nesfield was free to develop his plans for the treatment of the main walks and avenues in the grounds. He made this house the pivot of his design, and the leading features of his plan remain unaltered. They consist of (1) the gravel walk, 25 feet wide, which commences at the Main Entrance, extends 200 yards in the direction of No. III. Museum, and, after taking a turn almost at right angles about that building, continues in a straight line for 500 yards up to the Pond; and (2) the three wide vistas which radiate from the western entrance of the Palm House. It was some years before the latter portion of his plans was carried out. The Sion Vista, for instance, was not opened up until 1851.

In the 'forties great expectations were entertained of the place the deodar was to occupy in gardens. A row of trees was planted on each side of the Broad Walk, and the Pagoda and Sion vistas were afterwards treated in the same way. Unfortunately, the hopes that were held in regard to this tree were not fulfilled. Neither the soil nor the climate of Kew suits it. The best and healthiest specimens still remain, but they amount to less than a tithe of the trees originally planted.

At the time the Palm House was being built, the Pond on the north-east of it was merely a shapeless piece of water. A part of the formal design for the treatment of the environs of the Palm House was to deepen and enlarge this pool, and to bring it to its present form. About half the Pond is bounded by sloping banks; the rest is enclosed by a stone wall ornamented with flower-vases. The wall and the steps leading down to the water were built in 1847.

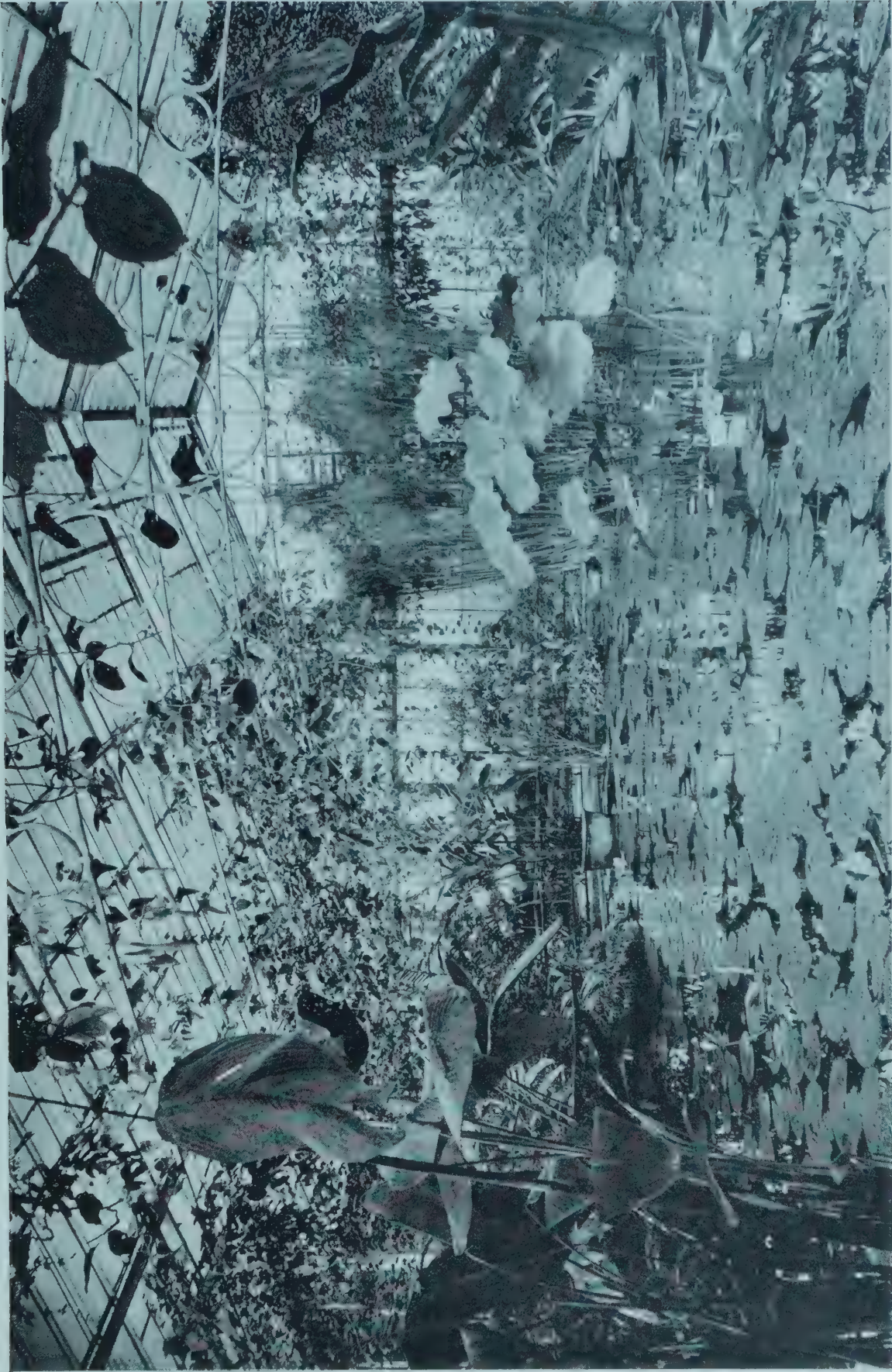
In 1848 the Palm House was completed, and Nesfield was again employed to lay out the ground surrounding it. The present terrace and parterre between the Palm House and the Pond, and the formal garden surrounded by a clipped hedge on the opposite side of the House, were the result. Formal treatment was essential in view of the position, but Nesfield's work was not so happy in detail as it was in its broader aspects. His numerous intricate "geometric" flower-beds, with their box-edging and gravel paths, were in keeping with the puerile fashion of the day, but they have long since given way to an ampler though still formal arrangement. The forty-five acres that had been transferred from the Pleasure Grounds to the Botanic Garden in 1843 were planted chiefly with coniferous trees, the original intention of making this piece of ground into an arboretum having been abandoned when the whole of the Pleasure Grounds became available for the purpose. The mound that is situated between the Broad Walk and the *Victoria regia* House (No. 15) was formed of material excavated during the construction of the Broad Walk. It also was planted with coniferous trees, some of which still remain.

The formation of an arboretum, or collection of trees and shrubs, in the Pleasure Grounds, was begun in 1848. The initial planting occupied three years. Sir William Hooker, in his report for 1850, observed that it was even then "perhaps the most complete collection contained in any single arboretum." It contained 2,325 reputed species and 1,156 varieties and hybrids, but a large proportion of these were duplicates under different names. The preservation of game for the benefit of members of the Royal Family residing at Kew was discontinued in 1849. Nothing is more inimical to the formation of an arboretum than the presence of ground game in large numbers. Rabbits were plentiful in Kew almost to the close of the nineteenth century, but they are now practically extinct.

Up to the year 1846 the Royal Kitchen Garden—the north-east corner of Kew Gardens abutting on the present Kew Road—was still retained for the private use of the Crown and remained under the management of W. T. Aiton. In the summer of that year, however, Aiton relinquished this, the last remnant of his once extensive charge. He was now eighty years of age, and for fifty-three years had held a more or less

The Arboretum.

Death of W. T. Aiton.



WATER-LILIES, LOTUS, AND PAPHUS.

important position in connection with Kew and the Royal service. He resided in the house in Kew Road now partly used as an office for the curator, and died at Kensington in 1849.

Queen Victoria, in pursuance of that generous policy which she always evinced towards Kew, and which Edward VII. has graciously continued, gave over the Kitchen Garden, which with an adjoining paddock covered about fourteen acres, to public use. It was added to the Botanic Garden, bringing the area of the latter to about seventy-eight acres. Sir William Hooker decided to devote a portion of this new acquisition to the collection of herbaceous plants, and it has since remained the home of this collection. Several transverse walls were razed, but the long wall which still shuts in this piece of ground was left for tender climbing plants.

Attached to the Kitchen Garden were several glass-houses and frames, which proved very acceptable, in the already congested state of the indoor collections. But more important than these was a building, partly fruit-store and partly a gardeners' dwelling. This it was decided to convert into a museum, in which should be exhibited interesting and useful vegetable products. A collection, consisting largely of objects which were the private property of the director and curator, was arranged and opened to the public in 1848. Thus was founded that important department of Kew—the Museums of Economic Botany. The old house still stands, ivy-covered, homely, and not perfectly suited to its purpose, as Museum No. II.

In another part of this book it is mentioned that the "New" Palace partially erected by George III. was demolished by his successor in 1829 (see "Palaces of Kew"). From that date until 1847 the site of this building had remained much neglected. But during that year the ground was cleared of the *débris* that remained, and the riverside terrace known as "Queen Elizabeth's Lawn" was made; the entrance gates to Kew Palace were erected; and the ha-ha between them and the Brentford Ferry Gates was dug. The lawn derives its name from an ancient elm beneath which, tradition says, Queen Elizabeth in her girlhood used to sit (see "Notable Trees").

On the pillars of the Kew Palace Gates are two sculptured dogs, now much defaced and weather-worn. They are stated to have come

from a house that once stood next to the "Dutch House" (the present Kew Palace). The former, according to tradition, belonged to Sir Richard Levett, who, in 1697, became the owner of the "Dutch House" also.

The most important event of the year 1847, not only to Kew, but to botany and horticulture in general, was the despatch of the director's son, Joseph Dalton Hooker, on a "scientific Himalayan Travel. journey" to Northern India. This memorable journey, afterwards described in the classic "Himalayan Journals," occupied three years and four months. So far as English horticulture is concerned, the most important part of the journey was spent in the Sikkim Himalaya, whence Dr. Hooker first introduced those magnificent rhododendrons which are now the chief glory of many a garden in the warmer parts of the British Isles. Kew itself was enriched not only with these and many other living plants, but with great quantities of herbarium material and museum objects also.

The first decade of the management of Kew by Sir William Hooker witnessed a greater series of changes than can ever, in the nature of things, be seen again in a similar period, 1841 to 1850. so long as the establishment exists on its present basis. His charge, which at first was comprised in fifteen acres, had in four years grown to nearly 650 acres. More than half of this consisted of the Richmond Old Deer Park, which, being let to a tenant for grazing purposes, was not open to the public.

In 1850 the Government Department of Woods and Forests, under whose control Kew had hitherto been, was split up, and part of its functions given over to the newly instituted "Board of Works. of Works and Public Buildings." The Deer Park was retained by the Woods and Forests, but the Botanic Garden and Pleasure Grounds of Kew were transferred to the new Government department. Shortly afterwards, the director was relieved of the care of the Deer Park. Up to the year 1846 a wall, three-quarters of a mile long, had divided it from the Pleasure Grounds of Kew. This was pulled down, and thus were opened to the view of visitors long level stretches of grassland, and the wooded portions of Sion Park and Thames bank in the distance. Kew remained under the Board of Works until March 31st, 1903, when it was transferred to the Board of Agriculture and Fisheries.

CHAPTER VII

KEW, 1850 TO 1865

AFTER the completion of the Palm House in 1848, no striking addition to the general features of Kew was made for some years.

**Growth in
Popularity.** There was plenty to do to complete the work already begun, and to develop the various departments on lines already decided on. Yet the early 'fifties were notable years at Kew. The wonderful aquatic lily, *Victoria regia*, first opened its flowers there in June, 1850. The number of visitors, which had increased from 9,174 in 1841 to 179,627 in 1850, mounted up to 329,900 in 1851—the year of the Great Exhibition. The fine collections of rhododendrons and other plants from the Himalaya sent home by Dr. Hooker were known to include some of the most ornamental flowering plants in existence, and their development was being watched with the keenest interest. The Sion Vista, the noblest prospect in Kew, was formed in 1851.

An interesting item in the report for 1850 is an account of the despatch of plants to the Island of Ascension. Sir Joseph Hooker has recorded that in 1843, after the return of the Antarctic expedition to which he had been attached, it was decided to attempt to clothe with vegetation this lonely isle, at that time a naked, sterile spot. It is said that in 1843 there was but a single tree upon the island, and not any shrubs at all. The matter was put into the hands of Sir William Hooker for him and Kew to deal with. Living plants and seeds of species likely to succeed there were accordingly despatched year after year. Gardeners were also sent out to attend to them. Ascension was then under naval control, and in a report presented to the Admiralty in 1865 on this experiment, it was shown that it had been completely successful. "The island now possesses thickets of upwards of forty kinds of trees, besides numerous shrubs and fruit trees, of which, however, only the guava ripens. These afford excellent

timber for fencing cattle-yards. . . . Through the spread of vegetation the water supply is excellent, and the ships visiting the island are supplied with an abundance of vegetables of various kinds." This affords a concrete instance of the value of one phase of Kew's work.

The *Victoria regia* had first flowered in a small tank quite inadequate for the display of its noble proportions. In 1852 a new house with a circular tank 36 feet in diameter was built for it. The house is the present No. 15, situated some fifty yards north of the Palm House. The grounds surrounding the Queen's Cottage (at that time called the Swiss Cottage) were laid out on behalf of Queen Victoria and the Prince Consort.

The most important event of the year, however, was the presentation to Kew by Miss Blomfield of the botanical library and herbarium of her brother, Dr. W. A. Blomfield. The books alone were worth £800. This gift may be said to have been the beginning of the national botanical library and herbarium at Kew. Sir William Hooker's private herbarium, although placed unreservedly at the service of all students at Kew, did not become public property until after his death in 1865. In 1853 the herbarium was reinforced by a still more important gift. George Bentham, even then distinguished as a botanist, but afterwards still more famous as the author of the "Flora of Australia" and the collaborator with Sir Joseph Hooker in the *Genera Plantarum*, also gave his private herbarium and library to Kew.

To afford space for the accommodation of these important acquisitions, the Queen granted the use of the house on Kew Green (Hunter House), which had been occupied by the King of Hanover up to the time of his death. This building, twice enlarged since then, still holds the Kew herbarium and library.

The opening of the gardens almost unreservedly to the public in 1841 had proved a great success. The number of visitors kept on rapidly increasing, and to their excellent behaviour the director repeatedly bore testimony. A further step towards popularising Kew was taken in 1853. The gardens, including the hot-houses and museums, were opened to the public on Sundays. Kew was the first, and for many years remained the only, scientific institution that adopted this policy. The privilege



THE LAKE, WITH SION HOUSE IN THE DISTANCE.

was eagerly taken advantage of, the number of visitors increasing by 100,000, or nearly one-third, in the first year.

From 1845 onwards the collection of cactuses was greatly enriched by numerous acquisitions from Mexico, especially from the rich region of San Luis Potosi. Notable amongst them were a gigantic *Echinocactus Steinesii*, weighing 713 lb., and some tall specimens of Old Man cactus, *Cereus senilis*.

Giant
Cactuses.

The most remarkable cactus ever introduced, however, was a specimen of *Echinocactus Visnaga* from Mexico. It was 9 feet high, $9\frac{1}{2}$ feet in circumference, and one ton in weight. None of these giants lived long; bruises received on their long journey set up decay, which ultimately spread over the entire plant. A new house for cactuses and other succulent plants was built in 1855. It has been rebuilt since then (in 1905), but the foundations, stages, etc., are the same. This fine house, the present No. 5, is 200 feet long, 30 feet wide, and 20 feet high.

At this period one of the functions of Kew was to supply the Parks and Gardens under the Crown (amongst which all the parks of London were then included) with young trees. In 1850 a nursery had been started in which trees and shrubs for the use of the establishment could be raised. This is the present "Lower Nursery" near the Lake, now surrounded by a high hedge of holly. Five years later, another nursery was formed near Kew Palace to supply these outside establishments. Battersea Park owes much of its arboreal vegetation to Kew. In 1856, when it was in process of formation, nearly 5,000 trees were sent there.

Kew and
the Parks.

The most important event of the later 'fifties at Kew was the building and equipment of a new museum. The museum opened to the public in 1848 had proved a great success, and had been imitated in many other cities at home and abroad. Within a short time of its opening, the old house abutting on the Herb Garden no longer sufficed to hold the objects of interest and value that had been acquired. In 1854 it was decided to build the present Museum No. I., which faces the Palm House across the Pond. The following year its erection was begun, and in 1858 it was opened to the public.

A New
Museum.

Soon after the completion of the new museum came the formation of the lake in the Pleasure Grounds. Sir William Hooker

made the first proposals in regard to it in 1856. He pointed out that a great deal of gravel having been taken from the site for path-making, the excavation might easily be transformed into a sheet of ornamental water that could be replenished from the Thames. When, two or three years later, the building of the Temperate House was sanctioned by Parliament, the terrace on which it stands was made of material removed from the site of the proposed lake. By these and other means a piece of ground over four acres in extent was hollowed out. To supply this with water a tunnel was made, connecting it with the Thames. The whole was in working order by 1861. The river is still the only source of supply, but the original tunnel has been reinforced by an additional culvert, and an electric pump is also available when the tides are too low to serve.

A conspicuous feature in the grounds at Kew is the flagstaff. It is erected on a mound near the Kew Road, upon which there stood, in the latter part of the eighteenth century, the Temple of Victory. This fine piece of timber, which is Douglas fir, was obtained from the forests of British Columbia in 1861. It is 159 feet high and 20 inches in diameter at the base, and although the tree from which it was cut was a mere baby, both in bulk and in age, compared with the giants of the Western North American forests, it is interesting to note how this slender pole overtops by half its height some goodly-sized English trees close by. It is the second of two flagstaffs presented to Kew for erection on this spot, and its presence here is really the result of an accident. The previous one was offered to the Gardens in 1856 by Mr. Edward Stamp, and was about 118 feet high and 16 inches in diameter at the base. It was, however, fated to ill-fortune. Whilst it was being towed up the Thames from the London Docks it was cut in two by a boat. After being spliced and again made fit for erection, it was once more despatched to Kew. This time it arrived safely and was also safely conveyed across the gardens to the mound. As it was being hoisted into a vertical position, however, both it and the hoisting apparatus were blown over and came with a crash to the ground. The flagstaff was broken in three pieces. Kew did not lose anything by this *contretemps*, irritating as it must have been. Mr. Stamp, as soon as he heard of the disaster, immediately offered to present another and an even bigger pole. He was at this time engaged in



THE TEMPERATE HOUSE.

the timber trade of British Columbia, and on his return there at once had felled and despatched from Vancouver Island the present flagstaff of Kew. In order to avoid a repetition of the former accident the task of hoisting it into position was entrusted to some experts from Deptford Dockyard. By them it was successfully accomplished.

We have now reached the period which saw the accomplishment of the last and one of the greatest of Sir William Hooker's projects in regard to Kew. For several years past he had persistently appealed for better accommodation for plants requiring a cool greenhouse temperature. Whilst such things as orchids, ferns, and succulent plants had been well provided for, and the noblest plant-house in existence had been built for palms and other tropical trees, the beautiful vegetation of such countries as Australia, South Africa, the temperate Himalaya and Chile, was, in 1860, less adequately housed than it had been twenty years before. What was wanted was a house equal, or superior, in its dimensions to the Palm House. In this could be grown to a characteristic size the fine araucarias, acacias, fuchsias, the Himalayan rhododendrons, and temperate plants generally, of which Kew possessed the finest collection in existence. Many of the Australian plants, especially proteads, were no doubt the identical plants introduced by Peter Good and Allan Cunningham. But at this time they were huddled together in the Orangery (now No. III. Museum) and the present Aroid House. The director's energetic pleading, and probably his diplomatic skill, had at last their reward. In 1859 a grant was sanctioned by the House of Commons, and a plan was prepared by the architect of the Palm House—Mr. Decimus Burton. During the following year building operations were commenced, and by 1862 the great central block and the two octagons were completed. This structure eventually proved to be the most charming plant-house in Kew. Agreeable in temperature at all seasons, it is filled with a vegetation, not so strange perhaps to northern eyes as that of the Palm House, but providing greater feasts of flower-beauty. The completion of this house Sir William Hooker did not live to see. The last of the two wings was not, indeed, finished until 1899.

The practice of sending out plant-collectors from Kew for the purpose of acquiring herbarium material and enriching the collections

of cultivated plants was, as we have seen, renewed by Sir William Hooker. And during practically the whole of his directorate this policy was maintained. In 1843, W. Purdie was sent to the West Indies and New Granada, and J. Burke to Western North America. From 1847 to 1850, Berthold Seeman was attached as botanical collector to H.M.S. *Herald* during her voyage in the Pacific. He was succeeded in the same post by W. G. Milne from 1852 to 1859. Seeman subsequently went to Fiji (1860-61), and Milne afterwards collected on the West Coast of Africa (1862-66). Charles Barter joined Baikie's expedition to the Niger in 1859, but died at Rabba in the following year. His position as botanist to the expedition was filled by Gustav Mann, who returned safely to England in 1863. Charles Wilford was sent out to collect seeds and herbarium material in Corea, Formosa, etc. He was employed from 1857 to 1860. On his recall his place was filled by Richard Oldham, who collected in Japan, Corea, and Formosa. Oldham died from dysentery in 1864, and with his death came to an end the long succession of Kew collectors which had begun with Francis Masson when he went to South Africa ninety years before.

Owing to the establishment of numerous foreign and colonial botanic gardens with which Kew kept up a regular correspondence, the employment of specially appointed collectors became no longer so necessary. And when the leading nursery-men took up the practice and generously let Kew share in their collectors' consignments, still less was an official collector required. It should always be remembered, however, that Kew was the pioneer in this work. Before Masson went out to the Cape in 1772, the introduction of extra-European plants was a haphazard affair. But from that date until the death of Oldham in Amoy, an almost continuous stream of new plants was pouring into England from Kew collectors or from *alumni* living abroad.

Until 1864, Sir William Hooker had the assistance of John Smith, the curator of the Botanic Garden. In that year the latter resigned.

Coming to Kew in 1822, he had spent over forty years in its service. Possessing a wide knowledge of plants in general, he made ferns his special study and published several works upon them. He lived in Kew until his death, in 1888, at ninety years of age. He was succeeded in the curatorship by

another John Smith, who had had a successful career as a cultivator of tropical plants in the neighbouring garden of Sion House.

Sir William Hooker died at Kew on August 12th, 1865, having passed his eightieth birthday by six weeks. He had carried on his directorial duties with unabated vigour up to within four or five days of his death. He was buried in the village churchyard. How much he had accomplished for Kew has already—but perhaps inadequately—been told. It would be difficult indeed to imagine one and the same establishment under aspects more diverse than the Kew of 1841 and that of 1865. From a somnolent, loosely-managed, worn-out institution, whose chief glory was its traditions, it had developed into the first botanic garden in the world. In these twenty-four years the area devoted to botany and to scientific and ornamental horticulture had increased from 15 to 250 acres, and a large portion of it had been re-laid out. The Palm House and Temperate House had been built, as well as the Cactus House and other smaller ones; the important department of Economic Botany had been founded, and three museums devoted to its illustration; and a botanical library and herbarium had been established.

To do what had been done, a public purse, freely opened, was of course essential. Equally necessary, too, were Royal help and sympathy; but these, as in the other palmy days of Kew, seventy or eighty years before, had been fully given. Yet to bring all these into the service of the institution required tact and diplomacy, the faculty of inspiring confidence, and personal prestige. Sir William Hooker owed much, no doubt, to his attractive personality, but he carried with him also the repute of one of the leading scientific men of his time. It has to be remembered that, in addition to his administrative duties at Kew and his voluminous official correspondence, he was the author of many important scientific works. In a sketch of his life and labours contributed to the “Annals of Botany” by his son a catalogue of his works is given. It includes many standard books on botany; scientific serial publications, such as the “Botanical Magazine,” for thirty-seven volumes of which he wrote nearly all the text; and more popular publications, like the “Guide to Kew Gardens,” of which he brought out twenty-one editions, the first in 1847.

CHAPTER VIII

SIR JOSEPH DALTON HOOKER, 1865 TO 1885

At the time of Sir William Hooker's death in 1865, his son, Dr. Joseph Dalton Hooker, had already acted under him as assistant director for over ten years. He was, therefore, naturally marked out as his successor, and later in the year was duly appointed. So broad-based were the foundations of Kew as laid by Sir William Hooker, that they have been but little extended by his followers. Their work has been to build a noble superstructure. Viewed in detail, Kew is hardly anywhere the same as it was in 1865. But the framework is very much the same. Anyone who knew Kew in 1865 and had never seen it since, could still find his way about quite easily. The old landmarks are there—the Pagoda, the various temples, the flagstaff, the Campanile, the Palm House, the Orangery. The main routes are as they were then—the Broad Walk, the two great vistas, the Rhododendron Dell. But the place has become more open, and passing from one part to another is simpler. The iron fence which separated the Botanic Garden from the Pleasure Grounds went in 1895. The public, which since 1841 had only been able to see the Palace from a distance, can now enter its very doors. Vistas and smooth grass walks traverse portions of the grounds which Sir William Hooker only knew as thick wood and tangled undergrowth. There are, however, two important features in Kew to-day which he never knew: the picture-gallery, containing the collection of paintings by Miss Marianne North, and the Jodrell Laboratory, which has had an important bearing on physiological botany. The Rock Garden, too, represents a phase of horticulture which could only have been in its infancy in Sir William Hooker's time.

Among the first improvements undertaken by the new director was the formation of walks in the Pleasure Grounds. The popular walk which runs from the Unicorn Gate to the Lion Gate was made

in 1866, as was that also which leads from the Brentford Gate to the Broad Walk.

Between the years 1866 and 1868 the existing system of supplying water to the establishment was instituted. Almost since the inauguration of the Botanic Garden at Kew, the centre of the water supply had been near the present Cumberland Gate. Here, in 1761, the famous engineer Smeaton erected an engine to pump water from a well for the supply of the gardens. It was worked by horse-power, and appears to have been in use until 1850. It was then superseded by a steam engine. In 1855 the pumping station was removed to near Kew Palace, and water apparently was drawn direct from the Thames. This proved unsatisfactory, owing to the deposit that was left on the leaves of the indoor plants. At the present time water is pumped from the Lake into filter-beds near the pumping station, which lies to the west of the Temperate House. Thence it is pumped into a reservoir in Richmond Park, the height of which gives a good pressure. During a spell of dry weather over 300,000 gallons of water are used daily.

The stables of the establishment were originally in the same enclosure as the first pumping station, but they too were removed in 1867 to the same yard as the new pumping station. Their removal enabled a public entrance to be made from the Kew Road. This was opened in 1869 and named "Cumberland Gate."

In 1868 the handsome entrance now called the "Victoria Gate" was erected on the Kew Road opposite the central doors of the Temperate House. It was placed there in the expectation that a station on the London and South Western Railway was to be built in the vicinity. This arrangement having been altered, the gates and pillars were removed in 1889 to near the Campanile.

In connection with new public entrances, it may here be mentioned that the Isleworth Ferry Gate, which gives access to the banks of the Thames near the south-west extremity of the gardens, was opened in 1872. It is merely a wooden drawbridge, which is lowered during the time the gardens are open to the public.

The erection in 1868-9 of a new range of plant-houses, heated from a single stoke-hold, enabled eight old stoves, etc., each heated

by a separate furnace, to be demolished. In the new range, now known as the "T Range" on account of its shape, compartments were provided for tropical aquatics, orchids, economic plants, begonias and gesnerads, Cape heaths, and miscellaneous stove plants. To these houses, which still fulfil the same functions, a house for Nepenthes, or pitcher plants, was added in 1897.

During the whole of Sir Joseph Hooker's directorate the progress and condition of the collection of hardy trees and shrubs were a matter of special concern to him. The present disposition of the various natural orders and genera was mainly his arrangement, whilst the Pinetum, or collection of coniferous trees, was entirely his creation. This important feature of the Arboretum, which contains probably the most comprehensive collection of conifers in existence, dates from 1871-2. The pleasant and interesting walk that leads through the southern section of it, from the Isleworth Gate to near the Pagoda, was made in 1873.

One of the great improvements effected in the Arboretum (or Pleasure Grounds) was the formation of avenues. Both grassy walks and gravel paths were bordered by a formal alignment of trees, usually belonging to the same or allied genera. This arrangement is not only effective as a garden feature, but it also enables the trees to be examined and compared conveniently. The Thorn Avenue was planted in 1868, as were also the quaint and striking avenues of Irish yews leading up to the Pagoda, and the two rows of deciduous trees on the Pagoda Vista. The Avenue of Atlas Cedars, now a popular route from the Sion Vista to the Pagoda, was made in 1871; in the following year was formed the Acacia Avenue, which runs through the collection of Leguminosæ, and in 1874 the Holly Walk. The Sweet Chestnut Avenue, which runs parallel with the western end of the Sion Vista, was planted in 1880.

All this, however, was only part of a great scheme for the re-organisation of the tree and shrub collections which was inaugurated and carried out by Sir Joseph Hooker. The results of much of the work done in this department in his father's time had been disappointing. The poor soil of Kew and the arid conditions that very frequently prevail there during the summer months render the establishment of transplanted trees a task of great difficulty. The facilities for

Tree-felling
and the
Public.

artificial watering were not then what they are now. It is no wonder, therefore, that of the thousands of trees planted when the Arboretum was formed, very many either died outright or remained stunted and sickly. The naturally adverse conditions were aggravated by the existence of a great number of large trees among the collections. The removal of decayed or overcrowded trees has always been a matter about which expert and lay opinions have been at variance. And this was so at Kew. Landscape gardening has this in common with politics: everyone feels himself justified in offering an opinion about it without the advantage of any previous study of the subject. But in addition to the difficulties arising from a short-sighted public sentiment, well meant perhaps, though proceeding mainly from ignorance, Sir William Hooker had to contend with opposition from quarters where he might well have looked for support. In the end, many of the trees he desired to have removed either died or were blown down, but in the meantime the progress of the national collection of trees and shrubs had been retarded by twenty years.

One of the most picturesque portions of the grounds at Kew is the little valley near the flagstaff, generally known as the "Berberis Dell." Originally a gravel pit, the idea of bringing it to its present conformation was entertained as early as 1869. A large quantity of gravel was removed during the following years, but it was not until 1876 that the work was finished and the ground planted.

In a political sense, the year 1872 was a memorable one in the annals of Kew through the amount of public attention which was focussed on the establishment. It arose through the publication of the details of a controversy between the director and his official superior, the First Commissioner of Works. Not since 1840 had Kew filled so prominent a place in the public mind. In 1872 the First Commissioner was Mr. A. S. Ayrton, a member of Mr. Gladstone's first Administration. It is charitable to assume that Mr. Ayrton was a well-meaning man, and that he had the good of his department at heart. But his methods were, to say the least, peculiar. His chief aim in regard to Kew appeared to be the belittlement of the director's position. In view of the career and attainments of Dr. Hooker (as he was then), that in itself was bad enough, but what struck the plain man as being distinctly objectionable was his way of setting about it. The details

of this famous controversy need not be given here. For one thing, Mr. Ayrton has long been dead, whilst his opponent still lives, vigorous and alert, the Nestor of botanists. And a Blue-book on the question, as well as the newspapers of the time, is open to the curious in such matters.

A memorial which was addressed to the Prime Minister and signed by a number of leading scientific men—among whom were Darwin, Huxley, Tyndall, and Lyell—gave a detailed account of the whole controversy. Its publication brought the matter to a head, and immediately roused a storm of indignation against the First Commissioner. Almost the entire Press, even that portion of it which normally supported the Government, took the part of the director of Kew. And although Mr. Gladstone and other colleagues of Mr. Ayrton officially made excuses and explanations for him, we know from memoirs since published that in private most of them regarded his proceedings with angry contempt. The dispute, so far as the public were concerned, ended in the dog-days of 1872 by a debate in Parliament, initiated in the House of Lords by the Earl of Derby and in the Commons by Sir John Lubbock. Of the permanent results of the whole episode it is now difficult to judge. It probably aroused a more widespread interest in the fortunes of Kew, and made its work more generally known. It showed how much the establishment owed to the labours and unselfishness of the two Hookers, father and son; and it put the authority of the director on a firmer footing.

The greatest disaster that has ever been recorded in connection with the plant-houses at Kew occurred on August 3rd, 1879. In the morning of that day a storm of hail wrecked the glass roofs of most of the houses. The hailstones are recorded to have averaged five inches in circumference. Nearly 40,000 panes were smashed, and the weight of the broken glass amounted to eighteen tons. A grant of £7,000 for repairs was sanctioned by Parliament, and an army of glaziers was set to work. The tropical plants suffered from cold and exposure, but the houses were made whole again before winter.

The elaborate nature of the design carried out by Nesfield in his treatment of the parterre between the Palm House and the Pond has already been adverted to. His intricate scheme of gravel walks and box-edged flower-beds had always been costly to keep up, and

THE PARTERRE NEAR THE PALM HOUSE.



in other respects unsatisfactory. It was swept away in 1881; the ground was grassed over, and the present simple arrangement of formal beds substituted.

The two great periods of building activity at Kew were the sixth and seventh decades of the eighteenth century, and the directorate of Sir William Hooker. Not again, it is probable, will such active times recur, unless Kew or horticulture generally undergoes some sudden revolution. Yet the years between 1875 and 1880 were busy ones, too. The erection of a laboratory for the study and elucidation of physiological problems in plant-life opened up an entirely new branch of activity in the establishment. The building, which was erected and equipped at the expense of Mr. T. J. Phillips Jodrell, was completed in 1876. It cost £1,500. During the first year it was used by Professors Tyndall and Burdon Sanderson.

Constant and often large accessions of herbarium material since the death of Sir William Hooker had rendered additional space essential for its proper housing and arrangement. In 1876-7 a new hall, 86 feet long by 43 feet wide, was added to the old Herbarium building. A similar condition existed in the Museum department in 1880, when the entire collection of material relating to economic botany in the Indian Museum at South Kensington was transferred to Kew. The following year (1881) the east wing of No. I. Museum was built, towards the cost of which the India Office contributed £2,000. A popular and attractive feature was secured to the establishment when Miss North presented her paintings to the nation. A gallery for their display, also given by her, was built in 1880-1 and opened to the public in 1882. In 1882 the Rockery or Alpine Garden was made.

The advancement of Indian and Colonial industries by the distribution of seeds and plants of economic importance had been made a cardinal item in the work of Kew by Sir William Hooker. It was, perhaps, even more actively carried on by his son. Such important industries as those connected with quinine, coffee, cocoa, rubbers, gutta-perchas, fibres, paper materials, timbers, vegetable oils, tropical fruits, medicines, and many minor ones, were fostered, helped, and even started wherever and whenever opportunity occurred.

Sir Joseph Hooker resigned the directorship of Kew in November, 1885. He had been director for twenty years, after serving as assistant director for ten, and before that had been more or less officially connected with the establishment since 1847, when he started on his famous Himalayan travels on its behalf. To few men of science has been accorded a life so long or so full of interest and usefulness. And, happily, the whole story of his life cannot yet be told, for he still lives and works at his home in Berkshire. He was born at Halesworth in Suffolk, June 30th, 1817. Early associations naturally turned his interests towards botany. He afterwards studied medicine, and when but twenty-two years of age he was appointed assistant surgeon and naturalist to the great Antarctic expedition under Sir James Ross (1839-43)—the most perilous, perhaps, that ever sailed from British shores. That is nearly seventy years ago! From 1847 to 1851 he travelled in India, with results that have already been alluded to. In 1871 he visited Morocco and the Greater Atlas Mountains, and in 1877 travelled over some of the most interesting regions of Western North America. The advantages to science, and more especially to botany and to Kew, derived from these travels have been very great.

He was long the friend of Charles Darwin, who made him his first confidant in regard to the theories afterwards enunciated in the epoch-making "Origin of Species." To tell of all the honours and recognitions showered on Sir Joseph during his illustrious career would be too long a story for these pages. He received the K.C.S.I. from Queen Victoria in 1877, and was made G.C.S.I. in 1897. The German Emperor appointed him a knight of the Order *Pour le Mérite* in 1902, and on his ninetieth birthday Edward VII. conferred on him the Order of Merit. But in one sense greater honours than any of these to Kew (for the establishment has always claimed to share in his honours) were his presidency of the British Association at Norwich, in 1868, and his presidency of the Royal Society from 1872 to 1877. In 1907, on the occasion of the bicentenary of Linnæus, the Swedish Academy of Sciences awarded him the one specially-struck Linnæan Medal as "the most illustrious living exponent of botanical science."

DAFFODILS AMONG THE GRASS



CHAPTER IX

SIR WILLIAM THISELTON-DYER, 1885 TO 1905

THE resignation of Sir Joseph Hooker in November, 1885, was shortly followed by the appointment of his son-in-law, William Turner Thiselton-Dyer, as director. Mr. Thiselton-Dyer had been assistant director of Kew since 1875, and previously he had been connected with the Royal Agricultural College at Cirencester, the Royal College of Science for Ireland, and the Royal Horticultural Society. A varied experience in botany, agriculture, and horticulture, therefore, rendered him exceptionally well fitted to guide the fortunes of Kew.

It has already been pointed out that the foundations of Kew as laid by Sir William Hooker were so broad-based as to need but little extension. The chief work of his successors has been to carry on and enlarge the various spheres of activity which owed their genesis to him. That, however, has been a work of no small dimensions, needing much thought, labour, time, and steady perseverance. Some of the departments of Kew as left by Sir William Hooker were very ill-developed in comparison with what they have since become. The Arboretum is an example. It was founded on its present area by Sir W. Hooker in 1848-50, but owing to various causes had made but unsatisfactory progress up to the time of his death. It was his son and successor who reorganised and remodelled it on its present lines. But even then it was not till the last two decades, when it received many refining touches, that it could be regarded as having become really worthy of the establishment. The evolution of Kew, in fact, has been a very gradual process.

The most notable part of Sir William Thiselton-Dyer's work in the outdoor department has been its improvement from the point of view of landscape. It has been shown that an area given over largely to the accommodation of botanical collections is not incapable of artistic treatment. The beauty of the Lake has been greatly

developed; long, informal vistas have been made to give a sense of spaciousness which would otherwise be lost in an area so flat and thickly wooded as Kew; and every opportunity has been taken to bring into view attractive objects and scenes both within and without the gardens. **Improvements in Landscape.** The general health of the trees has been much improved—a factor of no small importance where so much of sylvan beauty depends on luxuriance of growth.

Of entirely new features in the Arboretum, the Bamboo Garden, made in 1891-2, and the Sunk Rose Garden near the Pagoda, made in 1895-6, are the most important. The Lily Pond, **New Features.** near the Pinetum, was made in 1897, and has developed into a charming spot.

The refining process which Kew underwent so largely during Sir William Thiselton-Dyer's directorate is very well exemplified by the walks and lawns. There is scarcely a walk which has not had its curves improved, and a great proportion of the lawn area has been relaid, its surface smoothed, and the beauty of its contours enhanced. Although an unobtrusive work, this is one involving much cost and labour, and there is nothing that helps more to give to a garden an air of finish and refinement.

The addition of the grounds of Kew Palace to the part of Kew open to the public has greatly improved the north-west portion of the Gardens. The first part so added (in 1895) was an **Grounds Extended.** area $4\frac{1}{2}$ acres in extent, called the Palace Meadow. It was part of the ancient lawn in front of Kew House, which is shown in eighteenth-century engravings, often with the old orange-trees of the time ranged in line on one side. When the Pleasure Grounds were given over to the charge of Sir W. Hooker in 1845, this piece of ground was retained as a precinct of the present Kew Palace. When, fifty years later, it was thrown open and annexed to the public grounds, the western side of the Gardens, including the Rhododendron Dell, was rendered much more accessible from the chief entrance on Kew Green. A further portion was annexed in 1902, the boundary fence being set back to the private nursery near Brentford Ferry Gate. Finally, in the autumn of 1905, the old stables of Kew Palace being demolished, the ground on which they stood, as well as Kew Palace itself, was, by permission of the King, brought into the Gardens.



A CORNER OF THE LILY POND.

On the occasion of the Diamond Jubilee of Queen Victoria, in 1897, her Majesty gave over to the public the grounds surrounding the Queen's Cottage. A considerable portion of these grounds is not adapted for the free access of the public, and as it was desirable also to retain the grounds as a sanctuary for wild bird life, a grassy walk, defined by light fencing, was laid through the most picturesque parts. To this walk visitors are restricted.

The last addition is the garden of Cambridge Cottage. For many years the house had been a residence of the Dukes of Cambridge; its chief entrance is from Kew Green, near to the church. On the death of the late Duke in 1904 it ceased to be occupied. The Cambridge Cottage of recent times was an amalgamation of several houses. One portion of it was occupied by the Earl of Bute who took so prominent a part in the foundation of the original Botanic Garden at Kew. By command of his Majesty King Edward VII., it was added to Kew Gardens. The present intention is to convert it into a museum illustrative of Forestry. The garden attached to it is still enclosed by old walls, in which, however, two gates have been made which admit the public from Kew Gardens proper. Several tanks of formal design are to be constructed in the centre of this garden for water-lilies and other aquatic plants.

Up to the present, whatever may be the case in the future, plant-houses have been in one respect like battleships. They have gradually become out-of-date and obsolete. In a large establishment like Kew, where greenhouses have been in existence for a century and a half, a certain number always have been necessarily behind the times, either in the arrangements for heating, or ventilation, or in the admission of light. But, since the year 1880 or so, strenuous efforts have been made to bring the plant-houses of Kew into line with the latest ideas in greenhouse construction. Many of the houses have been re-roofed, some almost or entirely rebuilt, and there is not one that has not been much improved. One of the most useful devices has been the employment of "T iron" for the rafters instead of wood. On the arms of this T the sashes rest, and they can easily be renewed when necessary. Besides its convenience, this system has the advantage of durability and lightness. To these improve-

ments, no doubt, the more robust health of the hothouse plants is largely due.

Of entirely new houses, the first erected during Sir W. Thiselton-Dyer's directorate was the Alpine House, in 1887. At that time the system of cultivating Alpine plants as illustrated in this house was quite new. It proved so charming and so popular with the public that the house was enlarged in 1891. In 1892 a small house for filmy ferns was built against the Tropical Fernery. They had previously been grown in glass cases in other houses. The Nepenthes House was erected in 1897. Of more importance than all of these was the completion of the Temperate House, so long desired and so long delayed. The south wing, or Mexican House, was commenced in 1895 and opened to the public in 1897. Soon afterwards, the north wing, or Himalayan House, was begun, and the whole structure was completed, planted, and opened to the public on May 1st, 1899. All these houses will be dealt with in detail later.

It will have been gathered from what has been written in earlier pages that one of the most important functions of Kew, ever since 1841—and, to some extent, previously—has been to help in the development of the British Colonies, both new and old, by fostering industries connected with plant-life. The years that have passed since 1890 have been very successful ones in this respect. The following testimony, extracted from a speech by Mr. Joseph Chamberlain in the House of Commons on August 2nd, 1898, will show how much, in the opinion of one of the most famous of Colonial Secretaries, the Colonies owe to Kew: "I do not think it is too much to say that at the present time there are several of our important Colonies which owe whatever prosperity they possess to the knowledge and experience of, and the assistance given by, the authorities at Kew Gardens. Thousands of letters pass every year between the authorities at Kew and the Colonies, and they are able to place at the service of those Colonies not only the best advice and experience, but seeds and samples of economic plants capable of cultivation in the Colonies."

The chief fields of activity have been the West Indies and British Tropical Africa. The decline of the cane-sugar industry in the West Indies, due to the competition of bounty-fed beet sugar produced in Central Europe, created a very serious crisis in the fortunes of those

Colonies. About 1897 a strong effort was made, at the instance of Mr. Chamberlain, to revive their prosperity. An Imperial Department of Agriculture for the West Indies was instituted, and the then assistant director, Dr. (afterwards Sir) Daniel Morris, was appointed its head. With the help of a number of young men selected from Kew and stationed in the various localities, much has been done, by the establishment of other industries and the teaching of improved methods of cultivation, towards bringing back something, at least, of the ancient prosperity of those beautiful islands.

The colonies and protectorates of Tropical Africa are being dotted over with botanical stations controlled in almost every case by Kew-trained men, who are endeavouring to establish new industries founded on plants already existing there, or on new ones sent out from England, and to promote amongst the natives habits of industry and responsibility.

The passing years have witnessed and still witness great literary activity at Kew. As long ago as 1882 a commencement was made in the Library on the colossal *Index Kewensis*. The work was published in 1895, and was estimated to contain 400,000 names of plants, with their native countries, and a reference to the publication in which each name first appeared. The *Kew Bulletin* was founded in 1887. The publication of the "Hand-lists" of plants cultivated at Kew was commenced in 1894. Completed in 1899, these lists, in their entirety, will constitute a new *Hortus Kewensis*. The preparation of Colonial Floras was resumed in 1892, and the *Botanical Magazine* and Hooker's *Icones Plantarum* were continued. More detailed notes of all these works will be found in later pages.

The history of Kew during the directorship of Sir W. Thiselton-Dyer may be concluded by enumerating in chronological order the chief events not already mentioned. In 1888 a refreshment pavilion, in the style of a Swiss chalet, was erected near the Temperate House; it has proved a great boon to the public, and is visited by several thousands of people on busy days. The employment of young women as gardeners in 1896 created a good deal of interest at the time. In 1898 it was decided to open the Gardens (not including the plant-houses and museums) every week-day at 10 a.m. from June 1st to September 30th. In 1902

a new wing, of the same dimensions as the one built in 1877, was added to the Herbarium building. On April 1st, 1903, the control of the establishment was, as we have seen, transferred from the Office of Works to the Board of Agriculture and Fisheries.

The building of a new bridge over the Thames at Kew, 1899-1903, was an event which had no direct connection with the establishment, but it had a very direct bearing on the comfort and convenience of a large proportion of its visitors.

**New Bridge
at Kew.**

The old bridge—one of the most picturesque of Thames bridges—had become quite inadequate for the traffic, especially pedestrian, which passed over it. Communication between Kew and the Middlesex side was originally effected by means of a horse ferry established in the reign of Charles I. It was stationed somewhere near the present Kew Palace, and was apparently the objective of Love Lane, the ancient by-way so often alluded to in earlier pages. The erection of a wooden bridge (1758-9) diverted the traffic from the ferry, and no doubt suggested to George III. the making of the present Kew Road and the abolition of Love Lane, which have already been referred to. This wooden bridge was ultimately demolished, and replaced by the bridge of stone (built 1783-9), which is itself now a thing of the past.

On December 15th, 1905, Sir William Thiselton-Dyer resigned the directorship, and was succeeded by Lieut.-Colonel David Prain, who had for many years been connected with the Royal Botanic Gardens, Calcutta, since 1898 as their chief officer.



FOXGLOVES NEAR QUEEN'S COTTAGE

CHAPTER X

KEW TO-DAY

THE organisation of Kew may be described in a few words. At the head of the establishment, but subject in matters of administration

to the Board of Agriculture and Fisheries, is the director. **Organisation of Kew Staff.** In him is vested the supreme control of the gardens, museums, herbarium, and police. His principal officers are an assistant director and three chiefs of departments :

the keeper of the herbarium, the curator of the gardens, and the keeper of the museums. His office is the centre of the establishment. Here he meets every morning the heads of departments, discusses with them work and correspondence, collates information from the respective branches, and distributes to those concerned such work, inquiries, etc., as have accumulated since the previous day. His office may be described as the clearing-house of Kew. The keeper of the herbarium is assisted by two principal assistants and seven assistants. The curator has one assistant curator and an office assistant ; besides being the centre controlling purely garden matters, his office is the place where accounts are kept and financial business conducted. The immediate control of the garden work is vested in five foremen, who have, for sectional charges, sub-foremen and gangers. The keeper of the museums, who has one assistant, is concerned chiefly with economic questions ; and the keeper of the laboratory with physiological ones. The total regular staff of Kew is as follows :—Director's office, 4 ; herbarium and library, 16 ; museums and laboratory, 10 ; gardens, 140 ; constables and police, 25.

To nine-tenths of the people who visit Kew the institution is not the headquarters of botany in the British Empire, nor the site on

As a Public Garden. which a greater variety of plants is to be seen than anywhere else on the globe, nor a great centre and training school in horticulture ; it is simply a beautiful garden—a place in which to spend a few pleasant hours. And whilst this is the most popular aspect of Kew we cannot say that it is the least important one. In 1907 nearly 3,000,000 visitors entered its

gates—a fact more eloquent, perhaps, of its value to the community than any other that could be adduced. Kew has one peculiar charm which appeals to and draws all classes alike. Without regarding it



PLAN OF KEW GARDENS IN THE PRESENT DAY.

as the home of the richest plant collections in the world, and looking upon it as a public garden merely, it has an air of detachment from the great city whose tentacles are rapidly encircling it, that no public

garden or park so near Charing Cross possesses in like degree. In no other such place can one rid one's self so readily of the feeling that London is all round one. Kew has always tried to preserve as much as possible the amenities of the private garden—that is to say, the least possible restraint on the freedom of visitors is exercised. For this reason the rich people who ride down from town in motor-cars or carriages can, on any but the crowded days, wander over its lawns and examine its treasures without losing entirely that sense of restfulness and freedom which they prize in their own domains.

For this reason, too, it appeals with peculiar force to those whose lot is cast in shop or office or factory. No one feels the delight of

**Types of
Visitors.**

Kew more than the tired worker with scanty leisure, who finds himself free for a summer afternoon, and comes here with wife and child. Botany in itself interests him probably not more than Greek, yet he admires the trees and lawns, the flower groups and beds please him, the strange and unfamiliar types of flower and leaf in the glass-houses arrest his attention. Still, the time of true enjoyment comes when, having wandered off to some shady spot, he stretches himself on the soft turf, and for an hour or two does nothing more arduous than watch the smoke from his pipe, whilst his spouse, in an attitude of less abandon, keeps an eye on the youngsters. Even then it would not be right to assume that he and those who have given still less notice to individual plant and flower are indifferent to the peculiar charm of Kew. They may not express it in so many words, but they breathe the free air with a keener relish and their mood is happier because they have surrounding them smooth, well-kept lawns, beds of rare flowers, an unrivalled variety of vegetable forms—in a word, that combination of beauty and order which gardening implies.

Both amateur and professional gardeners visit Kew in large numbers with a view to gaining a knowledge of the most suitable plants for their own gardens, to find out the names of those they already possess, and to become acquainted with the latest additions to cultivated plants. Every effort is made to acquire for Kew the best and

**Professional
Visitors.**

newest things, whether they be introductions from foreign countries or the fruit of the plant-raiser's skill at home. It is not always possible, under the many disadvantages that an unsuitable environment entails, to bring plants at Kew to the same perfection that is attained in gardens where the general

conditions are specially suited for one class of plants, and where all the thought, skill, and money are devoted to it alone. At Kew the cultivation of plants most ill-adapted to the climate and conditions has to be carried on. Therefore orchids may be healthier in gardens where the winter days are less gloomy and foggy; Alpine plants finer where the alternate thawing and freezing in winter and spring do not occur; conifers better grown where the rainfall is greater and soot a less prominent ingredient of the atmosphere. But it is generally admitted that the level of cultivation is high. On the whole, one is justified in saying that there is no one place in the world where ornamental gardening in all its phases can be so thoroughly, conveniently, and usefully studied as at Kew.

A certain class of visitor always characteristic of Kew from its early days has in recent years become much more abundant. This is the young man or woman going from plant to plant with a book of botany or plant-lore in hand, and trying to get to the bottom of the mystery of leaf and flower arrangement, or to fix the plant's identity in mind. Some of these visitors come alone, some in classes; some are teachers in elementary schools, many probably are their pupils; but whoever they may be, their increasing numbers is very gratifying. It is largely due, no doubt, to the encouragement of Nature-study by educational authorities, and to the many associations which have this object in view.

The pictorial or landscape aspect of Kew attracts a large and increasing body of painters, photographers, and picture-makers of all kinds. It is now a usual thing for artists to spend the whole of the spring and summer months working here alone. That Kew is worthy of their homage is, I think, proved by the work of the well-known and talented artist whose pictures illustrate this volume.

Kew has many functions, but none is more far-reaching in its effects than the training of young men for the various careers open to those whose special knowledge is of plant-life in one or other of its phases. At the present time Kew employs more than a hundred botanists and skilled gardeners. The former are mostly permanent employés, but the great majority of the latter stay for a short time only—usually about two years. They enter Kew after having had at least four years' experience in other gardens. Their object usually is to acquire such



KEW GARDENS FROM THE TOP OF THE PAGODA.

knowledge as will fit them for posts in the botanic gardens or commercial plantations in the Colonies and India, as managers and superintendents of public parks and private gardens in Great Britain, as County Council lecturers, and for positions in the various trades connected with horticulture.

Since Kew became a public institution, many hundreds of such men have passed through it. Most of them are, of course, natives of Great Britain, but a certain number of places are reserved for foreigners. These are eagerly sought after by men of nearly all civilised nationalities, but more especially, perhaps, by the Teutonic and Scandinavian races. The Kew staff, however, besides Europeans and Americans, has at times included Japanese and negroes. At the present time over seven hundred of its *alumni* are scattered over the world, spreading its teaching and proving the efficacy of its methods. Kew, in relation to the *personnel* of horticulture, holds, as has frequently been pointed out, a position analogous to that of the university in the ordinary field of education. It not only supplies material and unrivalled opportunities for the study of advanced horticulture and botany; it brings together at a receptive and impressionable age a considerable body of men. By bringing into force that stimulating element of competition and emulation which is the salt of a young man's life, it helps to mould his character as no previous part of his professional career can have done.

Besides the experience and teaching that employment among the plant collections gives, a fine horticultural library is provided, and several courses of lectures on botany and allied subjects are given annually. A debating society and a field club are admirable and important institutions, bringing into the curriculum a social element that is very valuable. The mere contact with a large number of men engaged in similar pursuits, which a term at Kew involves, has many advantages, especially to one who may have, in the future, the management of labour.

Not unnaturally the general desire of men of all ranks who had passed through Kew to keep in touch with each other and the parent establishment led to the foundation of the Kew Guild. This association issues a journal which constitutes a connecting link between all its members. This journal records changes and events at Kew, publishes news from members at home and abroad, and gives the names and addresses of all its members. As an

example of the cosmopolitan character of its membership, the following figures are interesting :—Asia, 46 ; Africa, 34 ; America, 60 ; Australasia, 18 ; and Europe, 63, exclusive of those in the British Isles. In the industrial development of British colonies and possessions, the Kew man has always been among the earliest workers. As soon as the *pax Britannica* has been established, and often before, he appears. He founds botanic stations where useful plants are grown for distribution, and he gives demonstrations of the best methods of cultivating them. He fostered the tea industry in India and Ceylon ; he also started the cultivation of cinchona there ; he has helped largely in the regeneration of the West Indian Islands ; and at the present time Africa is dotted over with the stations he is managing, each one a nucleus of what will probably develop into the most important industries of the continent. Often he suffers the fate common to pioneers : he sows that others may reap. Many a Kew man has laid down his life in the conscientious performance of his duty—as genuine a sacrifice to the cause of empire and of humanity as any soldier or missionary has ever made.

CHAPTER XI

THE PALACES OF KEW

ONE of the most confusing terms in connection with the history of Kew is "Kew Palace." An examination of the fine series of illustrations of old Kew in the No. III. Museum will show that the name "Palace" has been given to three separate and totally distinct buildings. Two of them were originally built as country houses for wealthy Londoners; the other was intended for Royal occupation, but was never finished.

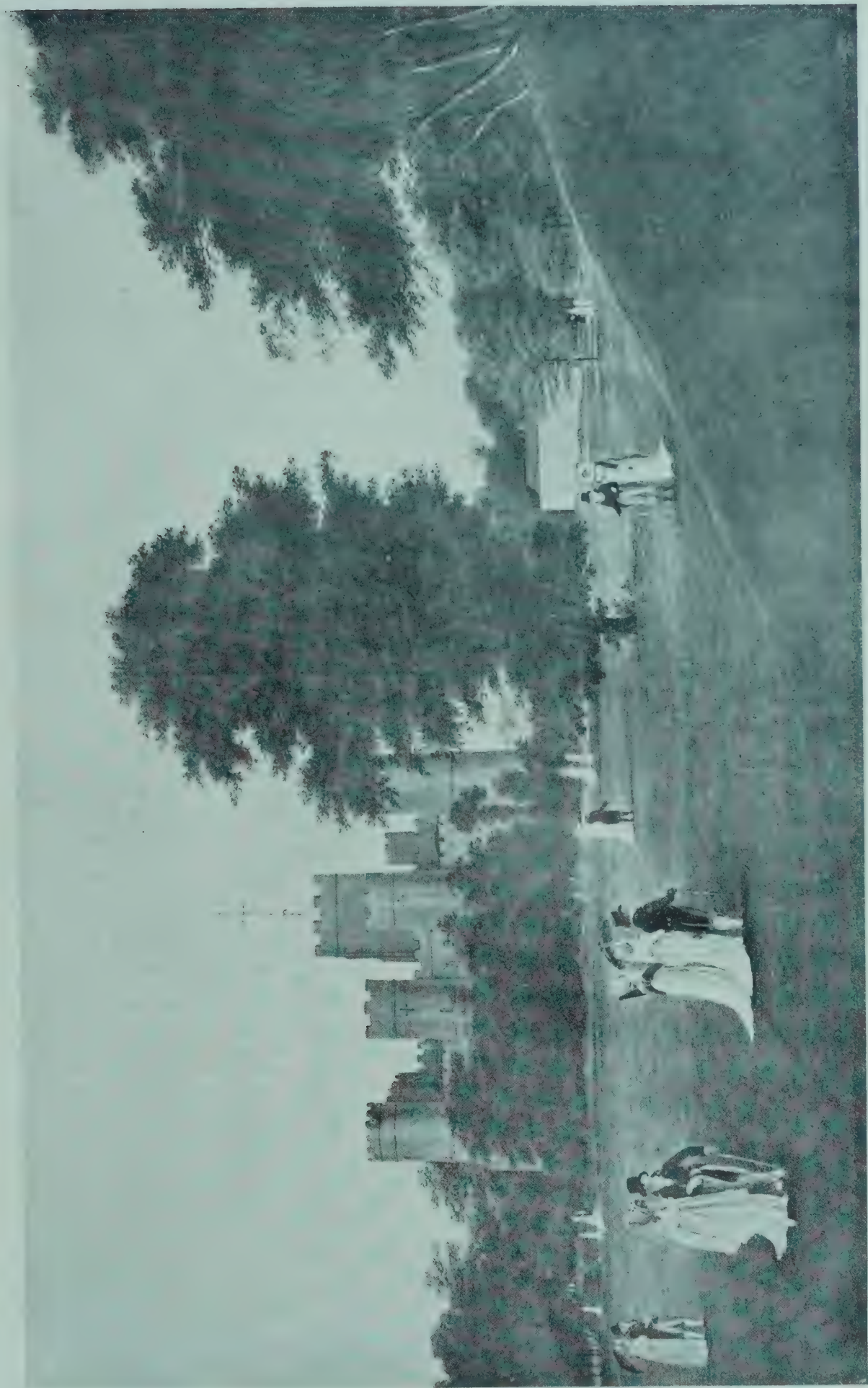
We have already seen in the early history of the Botanic Garden that a house in Kew, known as "Kew House" and "White House," **Kew House.** came to be occupied by Royalty in the person of Frederick, Prince of Wales, in the year 1730. It had previously been the residence successively of the families of Bennett, Capel, and Molyneux. From 1730 until his death in 1751, the Prince of Wales continued to occupy the house at intervals. It was then tenanted by his widow, Princess Augusta of Saxe-Gotha, and after her death in 1772 by her son, George III. It thus became, technically, at any rate, a "Palace," the first, indeed, of the Palaces of Kew. It continued to be a Royal residence until 1802, when it was demolished. The eastern extremity of its site is now marked by a sundial. The house itself was a long, low structure, of simple design, and was always more noteworthy for the gardens that surrounded it than for its own architectural features. Soon after it came into the Prince of Wales's possession it was refaced and remodelled by Kent, the famous architect. But it never had much interest apart from the fact that its immediate surroundings formed the nucleus of the famous Kew Gardens of later times. Fanny Burney (Madame d'Arblay), who was in the service of Queen Charlotte from 1786 to 1791, used to accompany the Royal Family on their visits to Kew, and on these occasions lived in this house.

When, in 1802, George III. determined to pull down the old Kew House of the Bennetts and Capels, he decided to build a new and

much larger Palace, from one hundred to two hundred yards away to the west. It was a singular site to choose, for the front faced the banks of the Thames exactly opposite the unlovely town of Brentford. However, the demolition of Kew House Palace. "New" Kew Palace.

was begun in 1802, and carried on whilst the Royal Family was visiting Weymouth. The erection of the new Palace was commenced in the following year. The King's idea, evidently, was to erect a mediæval, fortress-like dwelling or castle, with numerous towers, turrets, and similar appurtenances. The architect employed was James Wyatt, and the many illustrations extant show that he conscientiously endeavoured to carry out the King's wishes. The result was a building which, in outward appearance, would have been very appropriate to the reign of King Stephen. Nothing more than the shell was ever constructed, but it would be difficult to imagine a dwelling less suited to the needs and ideas of the time than this was. The general design is said by a contemporary writer to have rendered it impossible to construct within its walls anything more than "a series of large closets, boudoirs, and rooms like oratories." The same author (Phillips) compares it to the Bastille, and although the comparison has been demurred to, there do appear to have been certain points of resemblance, not so much, perhaps, in details of structure as in the dominant idea. The memory of the tragedy of Louis XVI. and the days of the Terror must at that time have still been very vivid, and one might almost imagine the new Palace to have been an expression of the intense anti-Revolutionary feeling which, naturally enough, animated the King and his entourage.

However, the increasing mental derangement of George III. led to a cessation of the work soon after the walls had been erected, and nothing more was done to it during his reign. His successor, George IV., caused it to be sold to builders as old materials, and its demolition was effected in the year 1829. During its destruction the premature collapse of one of the towers resulted in the death of eight men. It stood on the piece of ground now occupied by a nursery for trees, etc., facing the lawn on which is Queen Elizabeth's Elm. Remains of cellars, cesspools, and the like are still found when deep digging is done. Its situation can be almost exactly determined from the position of the three old elms which still stand near Brentford Ferry Gate, and which figure in nearly all the illustrations of the building as seen from the Thames side.



“NEW” KEW PALACE.

Some three hundred yards from the chief entrance to Kew Gardens stands the red-brick house which was for many years called the "Dutch House," but is known now as Kew Palace.

Kew Palace of the Present. It is the only survivor of the three buildings that have borne that title—a title, however, to which it can only lay claim as having been the dwelling-place of Royalty.

For in itself it is merely a plain, substantial mansion of Jacobean architecture, generally considered a fine example of its particular style, but possessing neither the size nor the dignity we associate with the word "palace." It is, however, a handsome building, whose attractiveness is considerably enhanced by the fine deep red of its walls. Its early history has been involved in some obscurity, but a good deal of light has been thrown on it by the researches of Mr. W. L. Rutton, F.S.A., whose valuable papers in the *Home Counties Magazine* (1905) have been largely relied on for the statements here made.

There appears to be little doubt that the present Kew Palace was built on the site, and partially on the foundations, of an older mansion known in its time as the "Dairy House." The earliest fact known about this house is that it was the property of Sir Henry Gate in 1552-3. During the reign of Queen Elizabeth it came into the possession of Robert Dudley, Earl of Leicester, the husband of the ill-fated Amy Robsart. A letter written by him from Kew, in September, 1560, shows that he was here at the time his wife came to her tragic end at Cumnor on the 8th of that month. They had been married in the chapel of the monastery at West Sheen, which in an earlier part of this book is mentioned as having once stood on the site now occupied by Kew Observatory. By 1595 the Dairy House had come into the possession of Sir Hugh Portman, the representative of a distinguished Somersetshire family, one of whom was Lord Chief Justice in Queen Mary's reign. His name is perpetuated in Portman Square, Marylebone. Sir Hugh died in 1604, but the house would appear to have remained in the hands of his brothers and nephews for twenty years or more afterwards.

About this time (1624-1630) the property was acquired by Samuel Fortrey, who probably demolished the old Dairy House. It was he, at any rate, who built the present red-brick house. Over the entrance there is the date "1631," with the letters "F.S.C." The date is, no doubt, that of the building, and the letters represent

the initials of Samuel Fortrey and Catherine his wife. Fortrey was of Dutch descent, and his house, although Jacobean in the main, is considered to have certain Dutch features; it came to be known, at any rate, as the "Dutch House," a name which clung to it for 150 years. Beneath the house is a Gothic crypt with a vaulted roof—remains, it is believed, of the old Dairy House.

By one of the Fortrey family, the grandson of the builder, the Dutch House was sold in 1697 to Sir Richard Levett, Lord Mayor of London three years later. The Levett family retained the ownership until 1781, when the freehold was purchased by George III. The house had, however, been occupied by members of the Royal Family as far back as 1734, and George III., whilst Prince of Wales, had himself spent some portion of his boyhood here. In later years, after he had ascended the throne and married, he came to live close by at Kew House, previously the home of his father and mother. The Dutch House then was used as an auxiliary dwelling. In 1801 he was kept there during a temporary fit of mental disorder, but it was not until the following year—Kew House being in process of demolition—that he, with his wife and daughters, made it their residence when at Kew. The King himself apparently paid his last visit to the house in 1806. On July 11th, 1818, his two sons, the Dukes of Clarence and of Kent, were married here, a temporary altar having been fitted up in the Queen's Drawing Room for the event. Four months later (November 17th), Queen Charlotte died in the "Queen's Bedroom," where her granddaughter, Queen Victoria, afterwards caused a tablet to her memory to be fixed above the fireplace.

With the death of Queen Charlotte the glory of Kew Palace departed; the house was never again occupied by Royalty, and for about eighty years it remained unoccupied and unused. In 1880 a low building, which connected the Palace with the offices of the present Works Yard, was pulled down, thereby isolating it. At the same time what is described as an unsightly wooden porch was removed from the entrance, revealing the letters and date alluded to above. At the Diamond Jubilee of Queen Victoria (1897), her Majesty directed that the Palace should be opened to the public. After it had been put into repair, this was done in 1899. In 1905 the old stables of Kew House, which



KEW PALACE : THE " DUTCH HOUSE " OF THE SEVENTEENTH CENTURY.

stood midway between the Palace and the present Museum III., having become unsightly and almost ruinous, were demolished. The boundary fence that separated the Palace from the Gardens was also removed. This effected a very great improvement. It enabled visitors to approach the Palace directly by a new curving walk branching out from the Broad Walk, instead of by a circuitous path round the fine Oriental plane that stands here. The site of the old paved stableyard is now converted into a lawn, where stand two ancient walnut-trees which previously grew within its walls. The view of the Palace which we give was also opened up at the same time by the removal of some small trees and a shrubbery intended to screen the stableyard.

Much of the old furniture of the Palace and the personal effects of George III. and his consort were from time to time removed whilst the building was shut up. Some articles, however, remained, and these are now being added to as occasion offers. There are two rooms containing pieces of old furniture, curios, engravings, letters, and various relics of George III., Queen Charlotte, and their children, which are very interesting. Other rooms are hung with oil paintings of inferior merit, and some are empty. The chief attractions of Kew Palace still are its romantic history, its architectural features, its ancient wainscoting and fireplaces, and the evidence it supplies of what was considered sufficient for the comfort of even a monarch a century ago.

PART II

ENGLISH LANDSCAPE GARDENING AT KEW

CHAPTER I

LANDSCAPE ART AT KEW

IF one were asked to define the leading principle upon which the artistic treatment of the Kew landscape was based in recent times, it could not be more tersely expressed than in the words of Sir William Thiselton-Dyer: "Landscape effects at Kew should be suave and ample."

As Kew covers nearly 300 acres, there would appear to be no necessity for cramped or patchy treatment. Yet there are several things which militate against entire freedom in this matter. The garden on three sides is bounded by buildings exhibiting various degrees of ugliness—from the sheds of corrugated iron on the Brentford side to the streets of slate-roofed villas on the others. All these have to be shut out. Kew, primarily, is a botanic garden, where trees, shrubs, and other plants have to be grown for purposes of study and comparison, irrespectively of their value in the landscape. Then its natural peculiarities—a flat surface and a dry, hungry soil; the fact of its being a public garden where crowds have to be accommodated and in some degree controlled; its frequently polluted atmosphere,—all these are hampering in their several degrees, either by rendering inadmissible certain modes of treatment, or by restricting the choice of planting material.

Yet, with all these disadvantages, Kew manages to represent in a very estimable way the typical English Garden—the garden which, as we believe, has a deeper-rooted, better-wearing charm than any other type of garden the world can show. What are the much-vaunted gardens of Italy, with their terraces, their marble masonry and fountains, their palms and aloes, dark cypresses and olives, or the arid, stark, compass-and-ruler garden of the Versailles model, in comparison with an English garden of the best type, with its noble trees and

The English Garden.



WILD GARDENING : DAFFODIL TIME.



far-spreading lawns, its gay parterres and borders of flowers, and its flowering shrubs? It is a garden peculiarly characteristic of the country, owing, as it does, its existence as much to English climatic conditions as to the proclivities of English people. It represents no slavish adhesion to any one set of views, and, where formal treatment is necessary or appropriate, this is frankly adopted.

Such a garden of "suave and ample effects" Kew aims to be, always subject, of course, to those interests and necessities of science on the one hand, and to the public enjoyment on the other, which have just been adverted to.

CHAPTER II

THE FORMAL GARDEN

It is a curious fact that gardening, an art as ancient as that of dress, should be subject to changes equally extreme. The conflict has ever been between the "formal" and the "natural" schools. The French have generally shown an extraordinary predilection for the first, even carried to extravagant lengths. Yet even in France, in the pre-Revolutionary days, Marie Antoinette made her "English Garden" at Petit Trianon—a place of winding walks and informally-grouped trees. The "English Garden" of that date was exemplified by the Richmond Garden of Queen Caroline and Bridgman, but by the time Kew had become a public institution the general taste in England was changing. Then, and for two or three subsequent decades, the prevailing fashion was for formal design.

The vogue, if it had not been set by Sir Joseph Paxton, was encouraged by him. His work in connection with Chatsworth, the Exhibition of 1851, the Crystal Palace, and many private gardens had given him a commanding position in horticulture.

The craze for formality—"balance" and "proportion" were the proper terms—inaugurated an era of clipped shrubs, box-edging, geometrical beds, and excessive masonry, which ultimately became ridiculous when it ended in carpet-bedding and beds made of variously-coloured stones.

Antagonistic Schools.

The inevitable reaction against this school set in, and then salvation was only to be obtained by making Nature the fetish. Nature was to be copied wherever possible, bedding was to be tabooed, trees and shrubs were to be left untouched by the pruner, the making of straight walks was to be avoided, "geometric" beds were things accursed, whilst statues, vases, or any form of bricks and stones and mortar in the garden were only to be tolerated in strictly limited quantities. Every budding author on gardening and every young woman with a message chirped their condemnation of the



THE BROAD WALK AND SUMMER BEDDING.

“formal garden.” At the present time, however, there are evidences of a counter-reaction. The present attitude of the very superior person is to regard the advocates of this school of landscape gardening as somewhat out of date, and as having become, in fact, rather tiresome.

The ordinary person, whose outlook has not become narrowed and distorted by the persistent advocacy of one set of views, believes there is room for both styles, and that each has its proper place. Kew, as a public institution, should be—and, indeed, is—eclectic in its attitude towards the different schools. It has never been devoted exclusively to the exposition of any one set of ideas. Its directors have been catholic in their tastes, seeking to retain the best and reject the worst, irrespective of the vagaries of fashion.

W. A. Nesfield, who was employed in 1845, and subsequently, to lay out portions of Kew, was unmistakably of the “formal” school.

Nesfield and Kew. To him we owe the Broad Walk, the Pagoda and Sion vistas, and the “geometric” treatment of the ground in the neighbourhood of the Palm House. In its broad lines Nesfield’s scheme still endures, being very well adapted to a flat piece of ground like Kew visited by great crowds of people. A good deal of his work was, no doubt, puerile, especially his design of box-edged beds and gravel walks for the great rectangle between the Palm House and the Pond, now, and for many years, superseded. Yet it was an expression of the ideas of the time. Twelve years or so later, Nesfield carried out the same ideas to extreme lengths in the South Kensington gardens of the Royal Horticultural Society.

The wide gravelled path known as the Broad Walk was dignified in its conception. Commencing at the Main Entrance, it extends to the corner of the old Orangery (now No. III. Museum), and then, taking a nearly right-angled turn, continues in a straight line to the Pond. It is bordered at intervals by large curving beds of rhododendrons and simple oblong flower beds, used for tulips, hyacinths, and other bulbs in spring, and for various flowering plants in summer and autumn.

The Palm House is the centre around which the formal garden of Kew is set. From its central door on the south-west side radiate three broad vistas. The Pagoda Vista stretches to the south for

nearly 1,000 yards, and has the Pagoda itself as the terminal. To the south-west extends the Sion Vista for about 1,000 yards also ;

The Great Vistas. it is then terminated by the river, but the view loses itself in the woods of Sion Park beyond. To the

north-west is a short vista—the Cedar Vista—which is terminated by the finest cedar of Lebanon in Kew.

On the north-east side of the Palm House is the great rectangular flower garden previously alluded to. The small intricate beds and narrow gravel paths of Nesfield have been replaced by a lawn on which a comparatively few simple beds have been cut out. They are planted in autumn with bulbs and other spring-flowering plants, which give in April and May a most delightful feast of colour and fragrance. As soon as they are out of flower they are replaced by pelargoniums and various other plants, beautiful in their flowers or their foliage, which keep up the display of colour till the frosts of autumn come again.

Shrubs and Lilies. The opposite, or south-west, side of the Palm House is also purely formal. The ground, which is partially sunk, is surrounded by a semicircular hedge of holly. For more than half a century this hedge was of yew, but having become worn out it was replaced by holly, a shrub much better adapted for hedges near London than yew is. Inside this hedge is a series of beds devoted to the finest varieties of roses—tea, hybrid tea, and hybrid perpetual. Between them and the terrace on which the Palm House stands are two depressions. These are filled with formally shaped beds cut out on the grass and planted with a selection of ornamental and interesting shrubs, mainly evergreen, and belonging to the heath family. This spot may also be called the Lily Garden of Kew, for here are grown most of the species and varieties. They are planted between the shrubs, a position experience has shown to be particularly suited for them, on account of the shelter afforded to the lily stems when young.

The dominating feature of this part of the formal garden is a number of clipped yews and hollies. The latter were planted here about 1850, and now vary in height from 4 to 15 feet.

Clipped Hollies. They are kept by the knife to a severely rounded shape, and increase very slowly in size. The general effect, as is the case with all examples of this type of gardening, is at first striking, but monotonous when one becomes familiar with it. For



THE FORMAL GARDEN: LILY TIME

this reason it is much better suited for a public garden visited by changing crowds than for a private one.

The depression on which this portion of the formal garden stands is the lowest and dampest part of Kew. The soil is naturally an almost impervious clay. It is really in the bed of that backwater or inlet from the Thames which is elsewhere alluded to, and of which the Pond on the other side of the Palm House is the sole remnant, although in former times it extended into the Kew Road close by, and over ground now occupied by tram-lines and villas.

CHAPTER III

TEMPLES AND OTHER ARCHITECTURAL FEATURES

THE landscape gardening of the eighteenth century was remarkable for an excessive use of fanciful structures. Of this there were, perhaps, no more striking examples than the Royal demesnes of Richmond and Kew. We have already seen that the most popular and most famous features in the Richmond gardens of Queen Caroline were Merlin's Cave and the Hermitage; and besides them there were temples and other buildings of a similar character. It was in the Kew Gardens of 1760 and onwards, however, that this craze for ornamental buildings was exhibited in such an extraordinary degree. Employed in moderation, classic temples give interest, diversity, and a certain distinction to the garden scene. They are often pleasing when they terminate a vista or an open glade; and their straight or curving lines, as the case may be, will often emphasise and enhance opposite characteristics in the vegetation with which they are associated. But the Kew of the late eighteenth century was dotted over with a strange assortment of buildings, which may have given the grounds a certain meretricious interest, but could not have contributed to the harmony of the landscape nor to the general artistic effect. In 1763, Sir William Chambers published a fine folio volume, in which many of these structures are described and illustrated by engravings. From this work some of the particulars here given were taken.

No object in Kew impresses itself so indelibly on the minds of the public as the Pagoda. Commenced in the autumn of 1761, and finished in spring of the following year, it has ever since been the most prominent landmark in the district. It was designed by Sir William Chambers, and built for the Princess Dowager of Wales. A year after it was completed, the architect congratulated himself on the fact that, notwithstanding its great height and the expedition with which it had been built, not the least



THE PAGODA FROM THE ROSE GARDEN.

crack or fracture had appeared in the whole structure. Were he alive to-day he would have infinitely greater cause for self-congratulation, for what he wrote in 1763 is still quite true. The Pagoda is octagonal, and is ten storeys high. The lowest storey is 26 feet in diameter and 18 feet high; above this each successive storey decreases one foot in diameter and the same in height. The total height is 163 feet. At the time of its completion an iron dragon crouched on every one of the angles of its ten roofs. These dragons, eighty in number, were covered with thin glass of various colours, which is said to have produced "a most dazzling reflection," and the roofs themselves were covered with plates of varnished iron, of different colours also. In place of these gorgeous iron plates, prosaic roof slates now keep out the rain, and as far back as 1849 a writer observed that the dragons had "long since disappeared." The top storey is reached by means of a winding staircase built of wood. The view from there is very extensive, although much restricted by the haze which for ever hangs over the London area. Sir William Chambers said that from the top you could command a view of upwards of forty miles in some directions. To-day it has to be unusually clear for Windsor Castle to be seen; but Harrow and Sydenham are nearly always visible. This building is not open to the public.

Of the several temples in Kew, the most elaborate in design and most effective as a garden feature is the Temple of the Sun. It is situated about 500 feet south of the Main Entrance, and was built in 1761, from the design and under the direction of Sir William Chambers. Of circular form, it is supported by eight fluted columns, and the entablature is richly ornamented. Inside, the centre of the concave roof is decorated with a representation of the sun, and on the frieze are shown in bas-relief the twelve signs of the zodiac. Near this temple is a fine cedar of Lebanon, originally from the Duke of Argyll's garden at Whitton, planted about the time the temple was built. The conjunction has proved a most happy one, the dark, straight limbs of the cedar and the curving lines of the white temple affording an admirable contrast.

The Orangery was erected by Sir William Chambers for Augusta, Princess Dowager of Wales, in 1761. It consisted of but one room, 142 feet long, 30 feet wide, and 25 feet high. It is still one of the

most ornamental architectural features that Kew possesses, its fenestration and light grey plaster front, modelled to represent bevelled blocks of stone, being peculiarly effective amid the surrounding vegetation. The cultivation of orange-trees in large tubs was one of the most popular forms of horticulture in the second half of the eighteenth century, and as the orange is not hardy enough to withstand the English winter unprotected, house-room had to be found every autumn. In one of the old illustrations of Kew House—the neighbouring residence of Princess Augusta—a long row of orange-trees in tubs appears. It was these, no doubt, that this Orangery was built to accommodate. When the gardens became public property in 1841, the orange-trees were removed to Kensington Palace, and the building was then used as a greenhouse, Australian and New Zealand plants forming the bulk of the contents. So it remained until 1862, when, the Winter Garden having been built, these plants were taken there. It was then devoted to its present use as a museum of timbers. As Sir William Hooker had acquired for Kew a large quantity of timber specimens from the International Exhibition of 1862, many of them large slabs or cross-sections of trees growing in the Colonies, the release of this house from its functions as a greenhouse was particularly opportune. At each end of the building, on the pediment above the doors, there is an escutcheon affixed to the wall and inscribed with the letter A. The shields were placed there by William IV., in grateful remembrance of the Princess Augusta of Wales, “who laid the foundation of all the surrounding scenes.”

Surmounting the wooded mound just inside the Cumberland Gate is the Temple of Æolus. It is of open, circular design, with its hemispherical dome supported by eight columns. At the time it was built it was furnished with a seat which revolved on a pivot inside the columns. Erected originally by Sir William Chambers about 1760, it had fallen into a ruinous condition by the time Sir William Hooker was appointed director. Under the superintendence of Decimus Burton, he had it rebuilt in stone in 1845 according to Chambers's original design. Embowered amidst the surrounding trees, which do not, however, completely hide it, its chaste, classic design is singularly pleasing.

If one could rely on old engravings in matters of situation, the temple dedicated to the goddess of War once stood somewhere

between the Temple of Æolus and the present Museum III., on a spot now traversed by the Broad Walk. The artists of 1763, how-

ever, do not appear always to have depicted the various features of Kew in their true relative positions.

Temple of
Bellona.

If the Temple of Bellona was not built where it now stands—a slight eminence close to the Unicorn Gate—it had been removed to that position some time prior to 1824. It was originally erected from the design of Chambers in 1760, and consists of a single rectangular room, covered with an elliptical dome, and fronted by a Doric, four-columned portico. The walls inside are decorated with stucco festoons and medallions, on which are inscribed the names or numbers of various regiments.

At the present time this temple is frequently spoken of as the “Temple of Minden.” The true Temple of Minden, however, which has long since disappeared, was built on the spot now occupied by the flagstaff. It was erected to commemorate the notable victory of Minden, August 1, 1759, and was originally called the “Temple of Victory.”

As in the case of the Temple of Bellona, it is impossible to reconcile the present position of the Temple of Arethusa with the one it occupies in Marlow’s engraving of 1763. It is probable that he and the other artists of Chambers’s book “composed” their pictures to some extent. If not, then it must have been removed to its present position (close to the base of the Campanile or Water Tower) from a spot south-west of the Palm House. It is not an important structure, being simply a covered garden-seat of classic design. Chambers, who designed and built it in 1758, describes it as “a small Ionic building of four columns.” It consists chiefly of brick and wood, and has probably been rebuilt since his time.

Temple of
Arethusa.

A temple built by William IV. stands on a mound about 150 yards north of the Temperate House. It was built to the design of Sir Jeffrey Wyatville in 1837, and at that time appears to have been known as “The Pantheon,” or the “Temple of Military Fame.” For about half a century it contained busts of George III. and George IV., William IV., the Duke of York, and the Duke of Wellington—all of them originals or copies by Chantrey, done in 1837. In March, 1888, they were all removed to Buckingham Palace, except the

King
William’s
Temple.

bust of George III., which was taken to Windsor. The inner walls are decorated with iron tablets bearing the names and dates of battles fought by British soldiers between 1760 and Waterloo. Sir William Thiselton-Dyer remarks that, according to local tradition, the workman was cutting the King's initials on the pediment of this temple when the great bell of St. Paul's began to toll the announcement of his death. The two marble statues standing on the pedestal of the eastern front originally came from Frogmore. They are by Pietro Francavilla, who was a native of Cambrai, in northern France. He was born in 1548, and is said to have been a pupil and follower of John of Bologna.

About midway between the Unicorn Gate and the Lion Gate, and close to the North Gallery, the walk which runs almost parallel to the Kew Road is crossed by an antique-looking structure known as the "Ruined Arch." It was designed by Sir William Chambers and built in 1759-60. His idea was to imitate a Roman antiquity, but the structure had to serve a practical purpose as well. It was erected to make a roadway over "one of the principal walks" by means of which carriages could enter the garden from what is now the Kew Road. It consists of three arches, the two side ones of which were at one time closed, and thus transformed into a pair of cells entered by means of doors in the sides of the middle arch. The doorways still remain, but all the three arches are now open. They were built of brick faced with stone, but much of the latter has fallen away or been removed. The air of antiquity which the architect sought to obtain by strewing the vicinity of the arch with fragments of stone supposed to have broken away from it, and by similar means, has now largely accrued from the hand of Time. Many decades have elapsed since it was built, and during the interval the surrounding trees have grown to great size; their branches now overhang the arches, old ivy trails down from the top, and a luxuriant shrubby growth surrounds the base.

About one hundred yards north-west of the Pagoda there is a mound on which once stood the Mosque, erected by Chambers in 1761. This mound is still known locally as "Moss Hill." The Mosque consisted of three rooms—a large octagonal one flanked by two square ones. The octagon was covered by a dome surmounted by a crescent, and each of the side rooms



THE RUINED ARCH IN THE EIGHTEENTH CENTURY.



THE RUINED ARCH AT THE PRESENT DAY.

was roofed by a smaller dome. A minaret was placed at each end of the building. Chambers's idea was to "collect the principal peculiarities of Turkish architecture." This building was demolished at some time previous to 1824, and the mound is at present chiefly interesting for the group of fine cedars of Lebanon growing on it. They were doubtless planted about the time the Mosque was built.

On some part of the spot now occupied by the Sunk Rose Garden—which is entered some fifty yards east of the Pagoda—there once stood the "Alhambra." It was an imitation of

Alhambra. Moorish architecture, designed by Chambers, and consisted of a saloon fronted by a portico of coupled columns and crowned with a lantern. It had disappeared by 1824. When the Rose Garden was being excavated in the winter of 1895-6, fragments of this building were unearthed, and the colours of some of the mural painting were still fresh.

The other temples and buildings described and illustrated by Chambers in 1763 need only be mentioned by name. They have long since crumbled to dust. Even the places on which many of them stood can only be conjectured now. But the mere enumeration of them conveys some idea of the extraordinary number and variety of structures with which the Kew of the latter part of the eighteenth century was embellished. Whilst some of them were trivial in character, others were of chaste and classical design, worthy of being constructed of more durable material than was used for them. Besides the temples and various structures, past and present, to which some notice has already been accorded, there were other temples dedicated to Pan, Solitude, Confucius, and Peace. The Temple of Pan was situated about midway between the present Cumberland Gate and the Ice House; the Temple of Confucius on a spot near to, or covered by, No. I. Museum. There were also the Chinese Pavilion (erected in the centre of a large tank which formed part of the Menagerie), the Gothic Cathedral, the Gallery of Antiques, and the Theatre of Augusta. Most of these buildings were designed by Sir William Chambers, but for some of them Muntz, Goupy, and Kent were responsible.

On the outskirts of the thick wood in the south-western extremity of the Gardens there stands the romantic-looking old house known as the Queen's Cottage. The precise date of its erection does not appear to be recorded, but it is marked on the plan of the manor of

Richmond prepared by Thomas Richardson, of York Street, Cavendish Square, in 1771. It was most probably erected by George III.

shortly after the death of his father in 1760. According to the same plan there existed in 1771, in front of the Queen's Cottage, the "New Menagerie"; it was termed

"new," no doubt, to distinguish it from the other and longer-established one near the original Botanic Garden of Kew. The Queen's Cottage stands in what were originally the Royal Gardens of Richmond. It takes its name from Queen Charlotte, the consort of George III., and appears to have been used as a sort of summer tea-room by the Royal Family.

Covered with a thick roof of thatch, and embowered among the surrounding trees and shrubs and its own luxuriant creepers, it represents exactly the type of rural cottage one sees pictured on the stage and in pastoral poems, but seldom in real life. The King and Queen were pleased at times to assume the parts of Strephon and Phyllis, and this Cottage made an appropriate scene for the play. But it would not be a comfortable place to live in—in which respect it resembles many other poetical conceptions when realised. Although it has four separate entrances, it consists of but one room above and a room and two small kitchens below. And the only way from the kitchens to the lower room, without going out-of-doors, is up one staircase and down another. Until a few years ago the walls of the room on the ground floor were hung with Hogarth prints, which were ultimately taken to Windsor. The ceiling and walls of the upper room are decorated with paintings of convolvulus and nasturtium climbing over bamboo-poles; above each window are a crossed spear and battle-axe with a crown superposed, all in gilt. The rooms are now unfurnished except for the old chintz curtains that drape the windows. But perhaps the cold emptiness of the Cottage helps one the better to re-people it with the ghosts of the King and Queen and the Royal children who made it their playground.



A WINTER SCENE : QUEEN'S COTTAGE.

CHAPTER IV

AVENUES, VISTAS, AND LAWNS

ONE of the first necessities of a public garden of the character of Kew, thronged as it is at certain times, is to plan it so that the crowds entering the gates may automatically dissolve. The best way of effecting this is to make vistas and avenues intersecting each other and connecting together all parts of the garden, yet each leading, if possible, to some notable feature. But whilst in this sense these avenues and vistas may be regarded as thoroughfares, they are also necessary in Kew, from a landscape point of view, to give that sense of spaciousness and dignity which the gardens from their size and importance demand. Where Nature has provided no hills and valleys, and where the lie of the land is as flat as it is at Kew, it is only by means of these long open sweeps that the distance of view can be obtained which in more favoured places is secured by natural diversities of level.

The three chief vistas at Kew are the broad gravelled walk leading from the Main Entrance to the Pond, with the water-tower as a terminal; the grass avenue known as the Pagoda Vista, which extends from the Palm House to the Pagoda, and is planted with two rows of varied and interesting trees; and the Sion Vista, also grassed, which commences at the Palm House too, and reaches to the river Thames. The view, however, extends more than twice as far—over the river and across Sion House Park. The terrace at the river end of the Sion Vista opens up the finest panorama in Kew. Beneath, but separated from the gardens by a ha-ha, flows the Thames; on the other side is the park of Sion House, with its herds of grazing cattle, and woods in the distance; whilst to the left stretches a noble reach of the Thames with the town of Isleworth at the end, suggesting sometimes, in the misty evening, a riverside mediæval city—a romantic conception which a closer acquaintance, unhappily, dispels. These three avenues, all formal in character, but of a breadth

and stateliness worthy of Kew, were laid down in 1845 soon after the gardens became public, but the Sion Vista was not completed until 1851. They were designed by W. A. Nesfield, and have been popular promenades ever since their construction.

Another important avenue connecting the Sion Vista with the Pagoda Vista was made during the directorate of Sir Joseph Hooker.

The Cedar Avenue. It is known as the Cedar Avenue, being planted on each side with Mount Atlas cedars. Having the Pagoda as terminal at one end, it affords a striking prospect.

It is now one of the arterial routes in Kew, and, unfortunately, has proved too narrow to bear the crowded traffic of these busy days. The maintenance of the turf in good condition is now a troublesome matter.

Several other avenues were made by Sir Joseph Hooker, who frequently employed the trees belonging to the botanical collections for the purpose. The idea was a happy one, because it brought together closely allied and interesting trees in a way that made them easy to examine and compare, and at the same time created some charming effects. Among these avenues is one composed of *Cratægus* (thorns) and *Pyrus* (crabs and their allies). In spring, when all in this group flower almost simultaneously, a most beautiful display is made. This is called the Thorn Avenue. The Holly Walk is an avenue planted with the most complete collection of hollies in any public garden ; it is a fine feature at any time, but delightful in mid-winter. The Acacia Avenue, near the Pagoda, planted with species and varieties of *Robinia* and *Gleditschia*, and an avenue of sweet chestnuts and oaks near the Sion Vista, are also interesting and effective.

All these avenues are formal in character—that is to say, the trees are planted at equal distances and in straight lines. We owe to

Informal Vistas. Sir William Thiselton-Dyer a further and more artistic development. During his directorate a large number of vistas, informal in character and of varying width, were opened up. They have no formal alignment, but are rather sylvan glades with an irregular bordering of trees. Some of them, such as the Woodland Walk, the Old Oak Avenue, and the Tulip Tree Avenue, traverse the more finely-timbered tracts of Kew, inviting one in summer by the pleasant shade they afford and interesting tree-lovers by the gnarled trunks of oak and the wide-spreading beeches they reveal.



AN INFORMAL VISTA.

These vistas, now carpeted with short grass, have opened up to the public portions of Kew which, although in many respects the most beautiful and most picturesque, were practically a closed book to all but one in a thousand of the people a few years ago.

In the more thinly-planted parts of the grounds, where the lawns are kept smooth, the same system of opening up long stretches to the uninterrupted view has been pursued. It is surprising how often the removal of a few trees and of the lower branches of a few others has been found to disclose a vista a quarter or half a mile in length. In visiting the demesnes of England one is very frequently struck by the neglect to open up the charming views which often exist. On such occasions there is nothing more irritating than to feel that beautiful glimpses of mountain, valley, or river, or even the quieter beauties of the English champaign, are being shut out, when a day or two's work with saw and axe would reveal them all. At Kew these vistas have done much to rectify the somewhat amorphous character of certain parts where the trees had been dotted about without regard to anything more than giving a sufficiency of space for the development of each. The separation of the trees into groups, which the formation of vistas has often involved, has given a form and definiteness to certain portions, and has much improved Kew as a picturesque garden.

If there be one feature which, more than any other, is the pride of English gardens, it is their broad sweeps of thick, closely-mown turf. Nowhere else in the world are the lawns so fresh, so green, so good to walk upon. There is nothing in the gardens the tourist envies so much. The credit belongs chiefly, no doubt, to the much-abused climate. Still, lawns require and respond to careful treatment and attention as much as do any of the subjects of the gardener's care. This is especially the case at Kew, where from two to three millions of people enter the gates annually, yet scarcely any restrictions to the free use of its lawns exist. Never, indeed, does one feel the delight of Kew more than when, on a hot summer day, one can escape the heat and dust and turmoil of Kew Bridge, or the busy Kew Road, to saunter along the ample stretches of soft green turf dappled with the cool shadows of many trees. The oldest lawn in Kew whose continued existence can be traced is the large open space in front of Kew Palace. It originally filled the

foreground of Kew House and, as old engravings show, was a spacious lawn in the Kew Gardens in the middle of the eighteenth century.

In more senses than one, the lawns and trees of a garden are its most important features. The lawns provide the pleasantest of all carpets to walk on and, together with the trees, they constitute the setting or general framework of all the choicer and more individual beauties it may contain. With its lawn well cared for, its turf thick and green, even the smallest garden is never without a certain dignity. The fact that at Kew the public enjoy an almost unrestricted access to its lawns is one of the chief reasons, no doubt, of its popularity. The famous legend "Keep off the grass" does not appear; all that is asked of visitors is that they do not trample down the edges. But this freedom involves an enormous amount of labour and attention in keeping the turf healthy and in good order. As one item, it may be mentioned that at least an acre of turf is used every autumn and winter to replace the worn patches of the previous summer. This, however, is largely due to the unavoidable congestion of the crowds in certain parts, such as in the more popular avenues and near plant-houses and chief entrances. Still, these places constitute but a small fraction of the hundred acres or so of lawn in Kew. It is to prevent any deterioration in the great areas that the efforts of the staff are directed.

The care of lawns involves three things: the eradication of weeds, "feeding," and mowing. A good many methods of ridding lawns of weeds have been advocated. It is a favourite field of **Management of Lawns.** for the amateur inventor; but it is still doubtful if any method is better than the old one of uprooting them with a spud or other garden tool. Dropping vitriol in the centre of the weeds and depositing salt on them are both efficacious methods, although if not done carefully they are apt to cause a temporary disfigurement of the lawn. The most troublesome weeds are plantains and dandelions; daisies, too, must be included, if they can be regarded as weeds. Now one of the best ways of keeping down such plants is to encourage the grass by generous treatment. It is where the soil is poor and the grass thin that these weeds get their firmest foothold. And this brings us to the second item—that of "feeding" the lawn.

The simplest plan of renovating thin, poor grass is to spread fine soil, rotted manure, or, in fact, fine humus of almost any kind thinly



SION VISTA.

over the surface. This may be done in February, and repeated annually as long as is necessary. Our experience at Kew with artificial "Feeding." manures as a top-dressing for lawns is not such as to lead us to recommend them. They stimulate the grass into great activity of growth for a short time, but produce no permanent benefit commensurate with the cost. Where lawns are very thin and poor, and do not respond to mere surface feeding, it becomes necessary to take off the turf, dig over the ground to the depth of about a foot, and add manure or good soil as the work proceeds. Such turf as may be worth it is then relaid, and the vacant space sown with a suitable mixture of grass seeds. With regard to the watering of lawns, it may certainly be said that in hot, dry summers nothing is so beneficial to them, especially where the grass is worn by traffic. In such a soil as that of Kew, the limit of watering need only be fixed by considerations of labour and expense. The automatic "irrigators" of various designs are admirable wherever they can be employed. They afford a fine continuous spray of long duration, which is far preferable to deluging the ground from hose-pipes.

It is not often that people realise how much we owe to Mr. Budding, the inventor of the mowing machine. The first machine was constructed from his model, in 1832, by **Lawn Mowing.** Ransomes of Ipswich. Probably no single invention has done so much for gardens. Without an enormous cost in labour the smooth, spacious lawns of great gardens would be impossible but for this machine. There are those still living who can remember having to mow the grass at Kew with scythes.

CHAPTER V

WILD GARDENS AND FLOWER MEADOWS

THE Wild Garden—perhaps a somewhat contradictory term—is not a garden run wild. It is a piece of ground set apart for the accom-

A Definition. modulation of native or foreign plants, which shall establish themselves and grow, flower, and increase in their own way; a spot, in other words, where plants—whether shrubs, bulbs, annuals, or herbaceous plants—should grow without any evidence at all of formality or design. A wild garden may be a piece of grass planted with daffodils, a shady bank where foxgloves and primroses have been made to grow, or a piece of woodland carpeted with wild hyacinth and anemone; or it may be all these, and more, in one. The ordinary work of the garden—the sweeping, the staking, the trimming—has no place here. But whilst the gardener's hand should not be evident—his highest art, indeed, appears when it is quite hidden—it is as necessary in its proper degree here as elsewhere. Although a “wild” garden, the plants in it should be selected for their beauty, and it is not every plant of beauty that can fight its way unaided. Weeding, for instance, has to be done. The bramble and elder, so aggressive in their methods, have to be restricted, the dock and hemlock need appear but seldom, and the nettle and gout-weed not at all. The gardener's part in the wild garden is that of the benevolent despot, encouraging and helping the worthy, repressing the unworthy.

In a wild garden the one great aim to be kept in view is to imitate Nature at her best; it may even be said to idealise Nature. A

Nature and the Wild Garden. wild garden should concentrate in itself as many as possible of Nature's choicest effects. Nature herself may not look like our wild garden, but one may recall

Turner's reply to the critic of “The Fighting Téméraire” who had never seen the Thames “look like that,”—“Don't you wish you had?” Only those plants which will grow easily and well



THE TEMPLE OF ÆOLUS : EARLY SPRING.

should have a place there, and all should be thoroughly adapted to the soil and situation. The wild garden is not the place to carry on struggles with refractory subjects. Each plant should possess to a considerable extent the faculty of taking care of itself. Thus, whilst the dwarf, finely-bred tea, and hybrid tea roses would have no chance, some of the strong rambling sorts of the Ayrshire, musk, and other types are admirable, alike for their grace and beauty and for their vigorous self-assertion. The planting of the wild garden must be done on broad and spacious lines. Small, "dotted" effects should be avoided. Bulbs should be planted in ample but broken masses, herbaceous plants in informal groups. In a place like Kew, resorted to by throngs of people, wild gardening has unfortunately to be confined to portions of the grounds railed off from the public, or to others but thinly frequented. This is necessary, because the young flower-buds of daffodil and many other bulbs used in this work are very easily crushed just as they are peeping through the ground and as yet scarcely visible. A single careless step may destroy half-a-dozen future blossoms.

The most ambitious attempt at wild gardening at Kew is on the mound or little hill surmounted by the Temple of Æolus, just within the Cumberland Gate. This piece of ground covers about two acres and, being completely surrounded by gravel walks, can conveniently be viewed in all its aspects at all times. On every side the ground slopes up from the walks to the temple on the summit. One side is well wooded, and whilst the trees give shade and variety, their dark trunks rising from the masses of blossom, especially in daffodil-time, add much to the general beauty of this spot.

The shady lower part of the wooded slopes is planted with a collection of British ferns. It is amongst these ferns that the first flowers of the wild garden appear in December and January. They are the Christmas roses or hellebores, whose pure white blossoms are peculiarly suggestive of the season when they appear. Rising out of the brown dead leaves of a year now past, they are the first harbingers of a spring, still distant perhaps, but promising warmth, sunshine, and flowers again. Somewhat later, the dainty cyclamens of Southern Europe send up their red or white flowers. Here, nestling among the fronds of fern or at the base of the tree-trunks, they are perfectly at home.

The Wild Garden at Kew.

Plants Used.

Associated with them are the blue star-like flowers of the *Hepatica* and its white variety. In another shady spot a colony of the Apennine anemone throws up every April its clustering masses of pure blue flowers, as do also the variously-coloured forms of *Anemone nemorosa*. In the open spots on the southern side of the hill (for they love the sun) are groups of yellow, blue, and white crocuses. On the same areas the purple flowers of the meadow saffron (*Colchicum*) appear in September. Then the beautiful chionodoxas and grape hyacinths have each their place.

But with all these, and many other such dainty gems, the real glory of this wild garden is made by the daffodils. It is about the middle of March that the clouds of flower that make this hill so lovely for two months begin to gather. Among the first comers is the old double daffodil. This is followed by a succession of varieties of daffodil and narcissus rising in masses from the grass, which reach their highest beauty in April, but continue their display until May, when the poet's narcissus is in flower. They are followed by masses of *Scilla festalis* (or *S. nutans*), the bluebell of English woods. The daffodil is the most useful of all wild garden bulbs. It seems able to take care of itself in all situations, whether in the grass or beneath the trees. Many thousands have been planted in the woods, the Queen's Cottage grounds, and the wilder parts of the grounds, and most of the kinds come up year after year with no evidence of deterioration. It is in such places, perhaps, that the daffodil looks its best, where irregular masses of flower stretch away in the distance beneath the trees, the areas of colour broken here and there by the dark trunks. Close to the Main Entrance is a patch of grass between the path and a shrubbery. This is planted with daffodils, crocuses, and other things. In the spring it is a very effective "flower meadow." The mound on which the flagstaff stands is also a wild garden. It is planted with spring- and summer-flowering shrubs, such as double gorse, rambler roses, and the like, and the open spaces between are filled with flowering bulbs. After the daffodils are over their place is taken by the bluebells. Great areas of them grow beneath the trees in the woods to the east of the Lake, but they produce the loveliest effects in the Queen's Cottage grounds.



QUEEN'S COTTAGE GROUNDS: BLUEBELL TIME

CHAPTER VI

ORNAMENTAL WATERS, TREES AND WOODLAND

THERE are in Kew three sheets of water of sufficient size to be worthy of notice, all of which are illustrated in these pages. First in importance, and largest in area, is the Lake. This feature of Kew, which adds more to the landscape charms of the place than any other, is of purely artificial origin. When its construction was begun by Sir William Hooker in 1856, the 4½ acres which it covers were on the same, or practically the same, level as the surrounding ground. Even at that time, however, a portion of the site was marshy. It is interesting to recall the fact that, one hundred years before, the famous Merlin's Cave of the old Richmond Gardens stood somewhere near the south end of the Lake, and that close to it was a pond. The excavation, begun in 1856, was carried on until 1861, when water was admitted by a culvert from the Thames. The area was enlarged to its present size, and the contour improved, by Sir Joseph Hooker in 1870. In later years, under the direction of Sir William Thiselton-Dyer, it has been greatly improved. The banks have been sloped and graded, new vistas and views opened, and everything possible done to disguise its artificial origin. So successful have these efforts been that strangers to Kew rarely regard it as other than natural.

The right use of artificial water is generally considered one of the most difficult things in the gardener's art. There are two ways in which it can be dealt with—the obviously formal and the natural. That this piece of water is a conspicuously successful example of the latter our illustrations show. One of its greatest charms is that the whole of it can never be seen at once. Traversing its banks, one comes upon fresh beauties at every few steps, and there is always left that delightful sense of curiosity to arouse and satisfy which is one of the greatest triumphs in landscape art. The four islands that diversify its surface, covered as they are with luxuriant vegetation, do much to

produce this effect. The treatment of the margins of artificial lakes is an important matter. A frequent cause of failure in the attempt to avoid formality is the conversion of the margins into a series of stiff curves and windings, which, in reality, are as formal as a genuine circle or straight line. Bays and promontories should of course occur, but a natural meaning should be given to them by leaving the level of the promontories considerably higher than that of the bays. In other words, the margin of the promontory should run down to the water much more steeply than that of the bay. The promontories, too, can be emphasised by planting upon them trees and shrubs; the lower-lying bays should be left more open. As regards the edge itself, it is better for it to be broken as if it had been worn away by the lapping of the water, rather than to have a low sloping surface where grass and water meet. At Kew, willows are largely used for planting on the banks of the Lake; the white willow and the weeping willow are the most notable. Flowering shrubs and moisture-loving herbaceous plants are also used.

The introduction in recent years of the fine crimson, yellow, and white water-lilies of perfect hardiness has added much to the charm of water-gardening. But their beauty has in some places led to their being over-planted. Water in the garden is never so effective an ornament as when it is clear and free to mirror sky, cloud, and tree. When a pond is used merely as a medium for the display of flowering aquatics, its interest and beauty are of quite another kind. Water-lilies and the like ought never to be allowed to interfere with broad effects; they should never be suffered to interrupt the eye over long sweeps of water. Small ponds they may be left to cover, but in larger ones their place is in colonies near the margin and in the lesser bays and inlets.

Next to the Lake in importance is the Pond. This piece of water is situated on the north-east side of the Palm House. Although treated in a frankly formal manner—the only manner possible in view of its surroundings—it is really of natural origin and naturally fed. At the beginning it was part of a shallow creek or backwater of the Thames. This, according to old authors, appears to have been transformed, either by artificial or natural filling up, into a series of ponds or lagoons. In the early years of George III.'s reign these lagoons were re-converted into one piece of water of considerable size, on which was an island, reached, as pictures



WATER LILIES

show, by a wooden bridge. This bridge was built by Sir William Chambers, whose design "was in a great measure taken from one of Palladio's wooden bridges." It was erected in one night.

Old plans show George III.'s Lake to have been in existence as far back as 1771, when it occupied part of the site of the present Palm House, besides extending some distance in the direction of Kew Palace. It was partially filled up in 1814.

George III.'s
Lake.

The Pond, which is all that remains of it, is still fed by underground springs. Filled up on some sides and extended on others, it was given its present character and semi-oval shape by W. A. Nesfield in 1847. The broad gravel path between it and the formal parterre on the Palm House side is a popular promenade in spring and summer. One of the chief attractions to the general public is a varied collection of waterfowl. A fountain in the centre of the Pond plays for a few hours on summer afternoons.

About 150 yards from the south-western extremity of the Lake, on the right-hand side of the avenue of Atlas cedars which stretches thence towards the Pagoda, there is the small piece of water which is so charmingly depicted by Mr. Olivier.

Water-lily
Pond.

Originally a depression caused by excavating for gravel, it was in 1897 made watertight by a "tamping" of clay. The condensed steam and waste water from the neighbouring pumping-station were then diverted into it. It has proved an excellent spot for water-lily culture. The noble aquatic plant, *Thalia dealbata*, succeeds very well in the slightly warmed water. The rare *Zizania aquatica* or "Indian Rice" also grows here and ripens its seeds annually.

In a garden situated on a perfectly flat piece of ground, as Kew mostly is, large trees become very important elements in the landscape. Variety of aspect and outlook can most effectively be obtained where there is a natural formation of hill and valley; in their absence trees make the only substitute. All the present diversities of surface in Kew are of artificial origin; but even now, were the place devoid of trees, the eye could range from a single point over pretty nearly every one of its 300 acres.

Trees and
Woodland.

The sylvan beauty of Kew is of two kinds. In the northern and more highly cultivated part most of the trees are isolated or in small groups. Here the interest and charm of the trees are individual rather than collective. Each tree is more or less a "specimen," and stands on its own merits. Many of them are of foreign origin

and of special scientific interest. The same holds good in regard to the trees in the botanical collections. Here all the trees of one genus are brought together, the predominant aim being to give to each one a sufficiency of space for its proper development, and by careful cultivation (pruning, manuring, etc.) to enable it to represent as perfectly as possible its particular kind.

But whilst this phase of tree cultivation will most strongly attract the student and connoisseur, the lover of woodland beauty for itself

The Woods. will be drawn rather to two separate, somewhat thickly-wooded areas in the south-western part of Kew. The larger of these areas is roughly triangular and about sixty acres in extent. Its three sides are bounded by the Holly Walk, the Old Deer Park, and the Northern Pinetum. It includes the wooded or eastern part of the Queen's Cottage grounds. The second and smaller area is known as the "Hollow Walk Wood"; this, too, is three-sided—the Rhododendron Dell (or Hollow Walk) defines its limits on one side, the Sion Vista on another, and the Hornbeam Avenue on the third. Before the construction of the Lake and Sion Vista, these two pieces of woodland were joined, and successive encroachments on the outskirts to meet the demands of the increasing botanical collections have considerably reduced their extent. But the arboreal vegetation of Kew, *in esse* and *in posse*, is greater than ever it was before. The majority of the larger trees, judging by those that have had to be felled, were planted from 150 to 200 years ago, and, as the greater sylvan areas are entirely situated in what were the Richmond Gardens of that period, we may safely assert that the woodland beauty of the twentieth-century Kew Gardens is largely due to Caroline, consort of George II.

The dominating tree of these woods is the beech, many fine specimens of which exist. The light soil is not the most suitable for the common oak, which likes the stiff soil of the Midlands; but many examples are to be found, a few of them of notable size. Three foreign trees, the sweet chestnut, the horse-chestnut, and the Turkey oak, thrive exceedingly well. The woods are practically made up of these five species. The elm is abundant in Kew, but is confined chiefly to small groups or individuals in the northern part. The lime, too, is plentiful about the grounds and in the woods of the Queen's Cottage. The only other tree found in any quantity is the hornbeam.

For those who care to find them, there are beautiful stretches of



IN THE WOODLAND.

woodland in the more remote parts of the grounds, where quiet reigns, rarely disturbed except by the scurry of the squirrel or the chattering of the jay; and shady recesses which are cool on the sultriest summer day. Considering how precious Kew's sense of remoteness is, how increasingly difficult it becomes to maintain it, it is surprising that even local selfishness can ask for the removal of the wall that separates the gardens from the Kew Road, and threaten thus to let in the ceaseless noise of traffic and the sight of trams, omnibuses, and all the unlovely attributes of a busy suburban thoroughfare.

Where Quiet Reigns.

The grounds in which the Queen's Cottage stands form one of the most beautiful spots near London. Except for an annual mowing of certain parts for hay, they remain undisturbed. The trees grow thickly together, and beneath them is a tangled, almost impenetrable growth of bramble. In more open spots the ground is carpeted in May with lovely masses of bluebell, which from time out of memory have filled these woods with beauty every spring. In front of the Cottage great masses of rhododendron make a gorgeous display in June.

Queen's Cottage Grounds.

When the Pleasure Grounds of Kew Gardens were given over to public enjoyment by Queen Victoria in 1845, about 37 acres surrounding this Cottage were reserved. They remained the private property of the Crown until 1897, when, in commemoration of her Diamond Jubilee, her Majesty gave them also to the public, at the same time expressing a desire that they might remain in their wild condition. At present the public are restricted to a grass walk which runs through the centre of the grounds within a few yards of the Cottage. From this walk several vistas and avenues penetrate the still depths of the woods.

In addition to their beauty and charm as a piece of Nature undisturbed, these woods are valuable as a sanctuary for wild birds.

Bird-Life. Of these, Mr. W. H. Hudson, a leading authority, has enumerated about eighty species as inhabiting Kew, the majority of which make their home here. It is a pleasant fact that an unusually large proportion of them are singing birds. Mr. Hudson has observed that "even in a perfectly rural district it would not be easy to find so great a variety in the same space; and it is, indeed, this variety and abundance of bird-music which to the lover of Nature give to Kew Gardens their principal charm."

CHAPTER VII

ROSE GARDENS AND PERGOLA

THE rose is still the most loved of all flowers. Its beauty, fragrance, associations, give it a place in the hearts of English people that no other flower can approach. It is appropriate, therefore, that the national garden should show it in all its phases and at its best. Yet the cultivation of the rose at Kew is something of a *tour de force*. The dry, sandy soil is the very opposite of what it needs. The feelings of the adoring country youth when he saw the divine Siddons in private life regaling herself heartily on beefsteak and stout, or some such fare, can well be understood. It was Dean Hole, I think, who compared the lad's distress with that of romantically-inclined people who learn for the first time what the rose requires to bring its flowers to perfection. The rose is, in fact, a gross feeder and a heavy drinker. It likes a moist, deep, strong soil, heavily manured. The natural soil of Kew is dry, shallow, and sandy. In whatever part of it roses are grown, it is necessary for the soil to be removed to a depth of about eighteen inches, and replaced by a strong, stiff loam brought from a spot several miles away.

In Kew the rose has to be regarded in its botanical as well as its horticultural aspect. About seventy genuine species of *Rosa* are known; they are spread widely over the northern hemisphere. Such of them as will succeed out-of-doors —and they are the great majority—are cultivated in borders situated between the Temperate House and the Pagoda. Here may be seen wild roses of many sorts—the dog-rose and sweet-briar of hedgerows, roses from the high Himalaya, the yellow roses of the Orient, roses from China, Japan, Siberia, North America, and the Alps of Europe. Although primarily of botanical interest, this collection contains many beautiful shrubs. It includes the wild types from which the popular garden roses have been derived after



THE ROSE GARDEN: CRIMSON RAMBLERS

centuries of cultivation and selection. Here, too, are roses whose associations awaken many thoughts, whose very names, indeed, are poems: the Damask rose, the rose from Omar Khayyám's grave, the York and Lancaster roses, the rose of Provence.

Passing from these borders to the east of the Pagoda, we reach another phase of rose culture. Here is what is known in Kew as the

**Rambler
Roses.** Sunk Rose Garden. This is an attempt to cultivate the rose in a picturesque way. The spot is one of the several pits which furnished the walks with gravel in earlier times.

In the autumn of 1895 it was decided to put it to its present use. The hollow was enlarged, and its depth increased by throwing up soil from the bottom on to the sides. These sides were held up by tree-stumps, and a sufficient depth of rich soil was provided. The work was finished and the whole planted in the spring of 1896. The nature of the site, with its mounds and steep banks, precludes the cultivation of the common dwarf, stiff roses. Fortunately a race has been largely developed in recent times commonly known as "ramblers." Many of them are descendants of such species as *multiflora*, *arvensis*, and *moschata*, and all are of free, vigorous growth. The leading characteristic of this race is their graceful, luxuriant habit, which fits them admirably for such a position as this, where their long branches can hang over the banks or clamber over various supports. Here they have been largely planted. A few pure species find a place, but the majority are of garden and hybrid origin. Some of them commence to flower in the last days of May, but in June—the month of roses—this garden attains its greatest beauty. A few flower in July; the most remarkable of them is "Crimson Rambler," the rose whose advent to cultivation was one of the most notable horticultural events of the early 'nineties. Here there is a large breadth of it.

The lover of roses who desires to study them further at Kew must now turn his steps towards the Palm House. In the neighbourhood of this house, especially within the area enclosed by
**Tea Roses,
etc.** the clipped holly hedge, there are numerous beds devoted to the best-known and most popular types of roses. In gardener's parlance they are the hybrid perpetuals (H.P.s), tea roses, and hybrid tea roses. Of these types the named varieties can now be numbered by the thousand. In their production the French have predominated, but English cultivators, such as the Pauls,

Dicksons, and Cants, have also played a worthy part. It would be as impossible as it would be unnecessary for Kew to attempt to cultivate more than a small fraction of them. But an endeavour is made to grow a selection of the very best, whether they are of ancient or of recent origin. Each sort is given a bed to itself, so that visitors have an opportunity of clearly appraising its merits. Standard roses find a place here, too. In spite of the condemnation of æsthetic people (and standard roses as plants are undeniably ugly and short-lived) they still remain as generally grown as ever. They have one great advantage over dwarf roses, in that they bring the flower to a position where its fragrance and beauty can be enjoyed without stooping.

To complete his examination of the roses at Kew, the visitor will have to go to the Pergola. It covers the gravel walk that runs

The Pergola. parallel with the west wall of the herbaceous garden, between the latter and the Rock Garden. The pergola, as a garden structure, is a creeper-covered walk of Italian origin. It is usually constructed of wood, with erect side-posts supporting a flat cross-piece. Sometimes the side supports are pillars of brick or stone. The pergola is essentially a garden structure for hot, sunny lands where shade is necessary for comfort. In the United Kingdom it is often used because it offers a charming way of growing many climbers. But instead of covering in the pergola completely with climbers and thus transforming it into a sort of square tunnel, as is usually done in the sunny countries of the South, it is often better in Great Britain to set up its sections several yards apart. Continuity and coherence can be given by connecting the arches by means of side pieces stretching lengthwise from the top of one post to the next.

The best material for constructing pergolas is oak. Branches as cut from the tree may be used, but straight squared pieces of wood are sometimes preferred as being more in keeping with the formal character of the pergola. The only objection to any kind of wood is that when once decay has commenced the stability of the whole structure is endangered, and repair is often awkward where the climbers have become old and their stems thick and stiff. The cheapest and most lasting material is iron; but it is ugly until covered with vegetation, and many climbers do not take to it so kindly as they do to wood. Iron, how-

**Materials
Used.**



A PERGOLA OF ROSES

ever, is used for the Pergola at Kew, and the arches are connected with each other by loosely-hung chains. It is about 600 feet long. Of too recent construction to have reached its best, this Pergola still presents a delightful picture in June and July. Two sorts of rose are grown on each arch, a strong climbing sort to grow overhead, and one of a dwarf type to furnish the sides. The varieties have been chosen solely on their merits, and the Pergola displays a collection of the best climbing roses known, from the favourites of our grandparents to those of most recent origin. A few other climbing plants are introduced at intervals, such as wistaria, jasmine, honeysuckle, and clematis. These give variety and some of them flower at seasons other than that of the rose. Still the Pergola is essentially a pergola of roses.

CHAPTER VIII

RHODODENDRONS, AZALEAS, BAMBOOS

SURROUNDED by fine trees, and planted almost exclusively with the most beautiful genus of hardy evergreens, the winding valley now called the Rhododendron Dell is one of the beauty-spots of Kew. When the rhododendrons are in flower in May and June, it is, in conjunction with the Azalea Garden close by, the most popular resort in the gardens. Even in midwinter, the charming disposition of the ground, the rich greenery of the plants, and the abundant shelter render a walk in this part of Kew very pleasant, for here the keenest north-easter loses much of its sting. It is only since Kew became a public institution that this dell has been devoted to rhododendrons. Its use for this group of shrubs was initiated by Sir William Hooker, but the area occupied by them has gradually increased. Many new varieties have been planted, and at the present time these rhododendrons form by far the finest collection in any public garden of any country in the world.

As will have been gathered from the historical portion of this work, the Rhododendron Dell is situated in what were the Richmond Gardens of the eighteenth century. It did not exist in those gardens during the time of Queen Caroline or George II., but was one of the very many extensive alterations carried out soon after the accession of George III. It was designed by "Capability" Brown, and local tradition has it that the actual work was done by the Staffordshire Militia. Two gravelled walks—one leading from the lawn in front of Kew Palace to the Rhododendron Dell, the other starting from the north entrance to the dell and leading towards the Sion Vista—are also believed to have been made by the same body of men. The former is known as the Princess's Walk, and the name of the latter—the "Stafford" Walk—still recalls those far-off days and the



THE RHODODENDRON DELL IN EARLY JUNE.

men by whom it was made. For many years after its construction—up to the time, indeed, when it was planted with rhododendrons—the dell was generally known as the “Hollow Walk,” a name often used for it even now.

Although all the great rhododendron nurseries are situated on a peat formation, and although a peaty soil is, no doubt, on the whole most suitable for these shrubs, the health and vigour of the specimens in this collection show that it is by no means essential. The soil here is an open sandy loam, and the plants offer every encouragement to those who have a similar soil and desire to grow rhododendrons. What these shrubs abhor is any calcareous matter near the roots; what they like are cool, uniformly moist conditions, and a soil rich in humus, especially decayed leaves. The happiest rhododendrons are those whose roots are always shaded by their own low-growing branches.

Some fine old cedars of Lebanon stand near the path, and about the middle of the dell an interesting group of camellias is worth noticing. For many years the camellia (at one time a fashionable flower) was considered a tender plant only to be grown under glass. But these plants, which are very healthy and flower well, have grown here for twenty years without any other protection than that which the situation affords. Along the dell, too, are some very old Weymouth pines (*Pinus Strobus*), sixty or seventy feet high, now picturesque only in their decay. Several of them are becoming covered with climbers, conspicuous among which is the clinging variety of the Virginian creeper, notable for the brilliant red its leaves assume in autumn before falling.

Just as rhododendrons furnish us with the most beautiful of hardy evergreen shrubs, so do azaleas supply us with the loveliest of deciduous-leaved ones. The two are closely allied; they are sections, indeed, of the same genus. The Azalea Garden at Kew had its origin in the early 'fifties of the last century, in what was then known as an American Garden made by Sir William Hooker. In 1881 it was remodelled and enlarged by his son, Sir Joseph. The plan he adopted, which with certain modifications is still maintained, was to cut out a series of beds on the lawn, each bed forming an arc in one of the two concentric circles of which the whole was composed. Since then some

of the walks leading up to the Azalea Garden proper have been bordered by beds of azaleas, making the whole much more extensive.

The azaleas flower in May, and then present a wonderful feast of colour and fragrance. What adds so much to the charm of the

scene at Kew is the setting in which it is placed. At that season the young unfolding leaves of the fine beeches, oaks, and lindens surround the garden with a beautiful background of tender shimmering green. The flowers of these azaleas range in colour from white and yellow through pink, rose, orange, to the richest scarlets and crimsons. They have been produced—largely by British gardeners—by crossing and re-crossing to an almost endless extent the North American azaleas and the yellow-flowered species from Asia Minor. Their needs under cultivation are the same as those of rhododendrons. They will not thrive where lime or allied substances are present in the earth. They like a cool, moist soil and, whilst preferring one of a peaty nature, succeed almost as well in a sandy loam enriched by decayed leaves, such as they have at Kew. Some fine Asiatic and American magnolias add to the attractions of this spot.

The cultivation of hardy bamboos is one of the most recent developments in English horticulture. A few species had been grown in

gardens as far back as the sixth and seventh decades of the last century, but it was not until about 1890 that the attention of gardeners generally began to turn towards

these plants. The Bamboo Garden at Kew, made in the winter of 1891-2, has proved one of the main factors in the popularisation of the cultivation of bamboos. The garden is in the form of a shallow depression, originally a disused gravel-pit, but enlarged by the removal of several thousands of tons of gravel and sand. Two of the most necessary things in the cultivation of bamboos are shelter and abundant root-moisture, and both were secured by making this garden a few feet below the general level of the ground. The centre of the garden is a large pear-shaped bed, 125 feet long by 75 feet wide, surrounded by an eight-foot path. Outside this have been formed a series of semicircular recesses, the sides of which are held up by tree-stumps. Each recess is devoted to a single species of bamboo. Given shelter and plenty of moisture, bamboos may be said to have had their chief requirements met. The soil should preferably be a sandy loam, and an occasional manuring is beneficial.



AZALEAS IN MAY

Bamboos, which are really woody grasses, are chiefly valued by the landscape gardener because of their exceeding gracefulness.

Their Place in the Garden. They represent a type of vegetation quite alien to that of Great Britain, and more characteristic of tropical than of temperate regions. But whilst some tropical

bamboos grow a hundred feet high or more, the stature of the species cultivated in Britain is limited to twenty or twenty-five feet. So different in character are bamboos from ordinary shrubs that it is desirable to keep them as isolated individuals, or in a specially selected area by themselves, as is done here. They strike an incongruous note if they are associated with the ordinary material used in shrubberies. All the species that are hardy in a climate such as that of Kew are represented in this garden, as are also many allied plants, such as the pampas grasses, the species of *Miscanthus*, hardy *Yuccas*, *Smilaxes*, etc.

PART III

KEW IN ITS SCIENTIFIC ASPECT

CHAPTER I

THE HERBARIUM AND LIBRARY

KEW is the headquarters of botanical science in the British Empire—one might, without extravagance, say in the whole world. That is its highest purpose. What Greenwich is to astronomy, the National Gallery to painting, the British Museum to archæology, such is Kew to botany. The facilities it affords for the study of this branch of natural history—in many respects the most important branch—are not equalled elsewhere. Its magnificent Library of botanical works (for practical purposes complete); its Herbarium, unrivalled in extent and unique in the number of type specimens it contains; its collections of living plants—all render it indispensable for the carrying out of any great work in botany. It is, in consequence, visited every year by a large number of foreign as well as native scientific men engaged on botanical monographs, in the preparation of new “floras,” or in botanical research of any kind. The Herbarium is, of course, concerned mainly with systematic and geographical botany—the identity of plants, their relative position in the vegetable kingdom, and their distribution over the globe. For the physiologist and anatomist there is the Jodrell Laboratory; and for the study of the practical uses of plants—or economic botany—there are the museums.

A herbarium, or *hortus siccus* as it was usually termed in earlier days, is indispensable to the proper working of a botanic garden.

Hortus Siccus. It is only by means of such an institution—and its necessary adjunct, a botanical library—that the identity of plants whose names are unknown or lost can be ascertained. At Kew, where the species actually in cultivation are numbered by tens of thousands, and where new additions are being made every day, the Herbarium and Library are in almost hourly requisition. That is their domestic function.



THE BAMBOO GARDEN.

But Kew has, besides, an imperial, even cosmopolitan, part to play. For many years it has been engaged in what may be termed a botanical survey of the British Empire, the object of which is to prepare and publish descriptions of all the plants native to the Colonies and India. This work, which is steadily progressing towards completion, is reviewed in some detail in later pages. It is only necessary now to observe that the material in the Kew Herbarium is the basis upon which the Colonial floras have all been built. Kew has always been in close association with the Colonial and Indian possessions of the British Crown, and its collections of dried material illustrating their various floras is the richest in existence. The Herbarium at Kew, however, exerts an influence even wider than the British Empire. The aim that is kept in view is to have preserved within its walls a complete and representative set of specimens of every plant-species existing on the globe. This aim is not yet, and may never be, accomplished; but the Kew Herbarium has got much nearer the goal than any other herbarium in the world has done. It has, therefore, become indispensable to the comprehensive study of the plant-life on all large areas, whether British or foreign.

The Herbarium building occupies a position abutting on the north-west corner of Kew Green, close to the chief entrance to the Gardens. At the end of the eighteenth century it belonged
 Hunter House. to Robert Hunter, who is said to have been a friend of the first Aiton. Then, or afterwards, it came to be known as "Hunter House." It was one of a series of substantial private residences which had formerly extended to Brentford Ferry, all of which—except Kew Palace—have disappeared. Sir Peter Lely lived at Kew, and his house is believed to have been the one next to Hunter House. In 1818, at the suggestion of Sir Joseph Banks, the Crown purchased Mr. Hunter's house with a view to utilising it for a herbarium and library in connection with the Botanic Garden. Banks, however, died in 1820 and the project fell into abeyance. From 1830 to 1851 the building was used as a residence by the Duchess of Cumberland and her husband, who in 1837 became King of Hanover. He died in 1851, and in the following year the ground floor was granted to Sir William Hooker for the accommodation of his herbarium and library. Although private property, they were placed at the service of the gardens and of botanists visiting

Kew ; and their scope was so extensive that this privilege was largely utilised by scientists both at home and abroad.

Kew possessed no official herbarium until 1853, when the herbarium and library that had belonged to W. Arnold Bromfield, M.D., were presented to the establishment by his sister. That **Beginning of the Herbarium.** was its real beginning. All the collections made by the early Kew collectors were retained by Sir Joseph Banks during his lifetime ; after his death they went to the British Museum, where they are still preserved. In 1854, George Bentham presented his herbarium and library to Kew. Sir William Hooker's herbarium was not acquired until 1866, when it was purchased, along with his library, by Government. The material of Hooker and Bentham formed the real basis of the Kew Herbarium, which since then has been annually augmented by many thousands of specimens, chiefly by gift and exchange, but to some extent also by purchase and bequest.

To accommodate these vast acquisitions of material, the old house has had to be twice enlarged. One wing, built in 1877, extends **Arrangement.** from the back in the direction of the river ; the second was built in 1902, and extends westwards. At the present time the Herbarium is lodged in these two wings, each of which is a quadrangle measuring 86 feet by 43 feet. The Library is in the original Hunter House. Besides the ground floor, each wing of the Herbarium building has two galleries. The cabinets (numbering about 1,300) in which the specimens are kept stand back to back in the spaces between the windows. Ordinary specimens are glued down on sheets of stiff paper measuring $16\frac{1}{2}$ inches by $10\frac{1}{2}$ inches. Many tropical plants with enormous leaves, flowers, and fruits, like the larger palms, it is, of course, impossible to have represented except by fragments, even when larger sheets are used. But wherever possible, the leaf, the flower, the fruit, and a portion of the branch are preserved—sufficient, that is, to fix and identify the species. Separate specimens from different localities are valued as showing not only the geographical range of a species, but also its variability under such diverse conditions as it may experience within that range.

The Herbarium now comprises over 2,000,000 specimens. It is exceedingly rich in “types”—a “type” being the actual specimen, or one of them, on which the original description was based by the person who first gave the plant its name. In the general arrange-

ment of the natural orders and genera of flowering plants, the Herbarium follows the *Genera Plantarum* of Bentham and Hooker. But

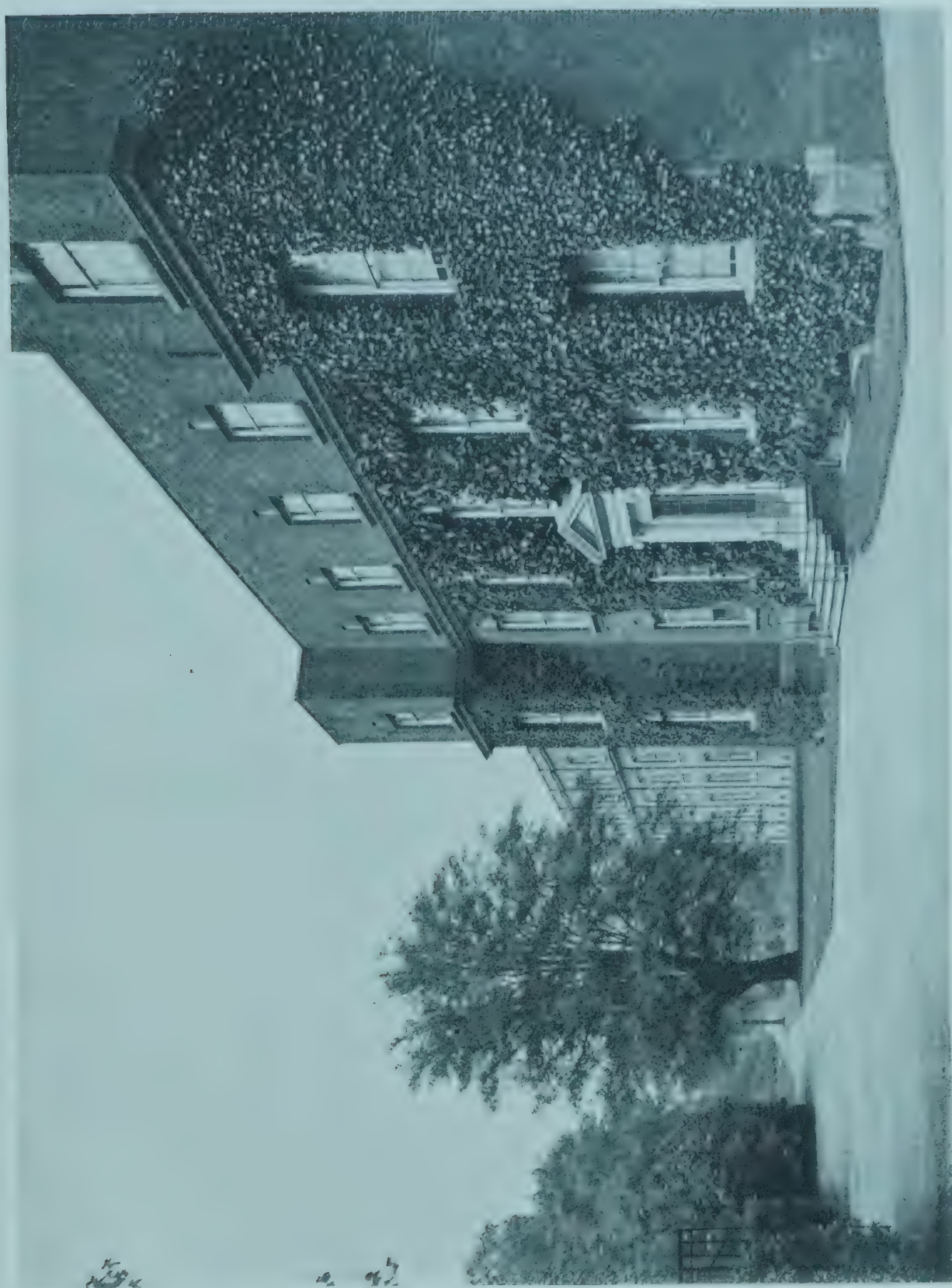
Extent. the species of each genus are arranged geographically ; for instance, the rhododendrons of India are put together, as are those from China and Japan, those from Europe, etc. For the purposes of this arrangement the globe is separated into eighteen geographical divisions.

The beginning and early development of the Library at Kew coincided with those of the Herbarium. It was founded in 1853

The Library. by the gift of Dr. Bromfield's books, and was largely augmented in 1854 by George Bentham's presentation of his library, which contained more than a thousand volumes. It has since been made as complete as possible by gift, exchange, and purchase. The most important purchase was that of Sir William Hooker's library in 1866. At the present time the Kew Library consists of about 23,000 volumes. These in the main, of course, deal with botany, especially that branch of botany which treats of the classification of plants. But it includes as an incidental feature a collection of books of travel, containing more or less botanical matter. These amount to 1,100 volumes. Though the books are mainly those essential for carrying on the practical work of the establishment, the early authors, whose writings are chiefly of historical interest, are well represented. The ancient history of the science may be regarded as dating from the time of Theophrastus Eresios, a Greek philosopher, who was born in 371 B.C. Writings attributed to him were first printed in Greek at Venice, but the work bears no date. Dated editions from the famous press of Aldus Manutius appeared in 1495 and 1498. In 1483 a Latin translation by Gaza was published, and of this rare work Kew possesses a remarkably well-preserved copy, besides copies of later editions. This, however, is not the oldest printed book in the Library, for that distinction belongs to the *Ruralium Commodorum libri duodecim* of Petrus de Crescentiis, a native of Bologna, who was born about the year 1230 and died in 1310. This work is dated 1471. It is a small folio in Gothic letter, without title-page, pagination, signatures, or catchwords, the customary characteristics of books of this period, and treats of planting and pruning trees, ploughing and threshing corn, flower and fruit gardening, country sports, etc. Numerous editions in Latin, French, and Italian followed, of which Kew possesses four. It may

be mentioned in connection with Crescentiis that a beautiful French manuscript of the work referred to above was disposed of in the sale of the Earl of Cork's library in 1905, and was purchased by Mr. Quaritch for £2,600. The *Liber Serapionis* of Simon Januensis, dated 1473, is the second oldest printed book at Kew. This production is based on the writings of the younger Serapion, an Arab. One of the rarest books in the Library is the small *Herbarius*, printed at Mainz in 1484. It is sometimes described as the first book printed in Germany containing botanical illustrations, but an earlier work, the *Buch der Natur* of Conrad von Megenberg, which first appeared at Augsburg in 1475, contains a few woodcuts of plants. An excellent copy of the 1482 edition was presented by the Bentham Trustees.

A curious volume is the *Herbarius zu Teutsch*, or, as it is popularly known, the *Ortus Sanitatis*, printed at Mainz in 1485. This work is in German, and contains rude figures of plants. The *Ortus Sanitatis*. The first dated Latin edition (1491) and several other editions are at Kew, as well as a German manuscript of about the year 1370. *Le Grant Herbiere*, a French translation of the German *Herbarius*, is represented by two undated editions, and the English form of *Le Grant Herbiere*, known under the title of "The Grete Herbal," and dated 1526, is the earliest printed book in the English language at Kew. The work of Dioscorides, a Greek physician who flourished about the middle of the first century, was first printed at Cologne, in Latin, in 1478. The Library contains the Latin edition published in 1549, and the second Greek edition of 1518, besides several commentaries on the writings of Dioscorides, of which the chief are those of Mattioli, some of which, it is worthy of note, are remarkable for the excellence of their illustrations. The famous Dioscoridian *Codex*, preserved in the Imperial Library of Vienna, dating from about the year 512, has been reproduced in facsimile by photography, and a copy of the reproduction, in two large folio volumes, was presented to the Library by the Bentham Trustees. It is especially interesting, as it "supplies the earliest authentic evidence of the traditional belief as to the plants known by the names which Dioscorides actually cited." A work of great historical interest is the *De Proprietatibus Rerum* of Bartholomæus Anglicus, or Glanville, of which numerous editions in Latin and French have appeared. Kew has a Latin edition dated 1483, and also an English edition printed at the press of Thomas



THE HERBARIUM AND LIBRARY.

Berthelet, printer and bookbinder to Henry VIII., in 1535. It may be mentioned here that the first English edition of this work was printed by Wynkyn de Worde about 1494, and this book was the first ever printed on English-made paper. The early illustrations of plants were more or less conventional, often partly imaginary productions, and no doubt in many cases were the degraded results of copying repeatedly, instead of making fresh blocks from the plants themselves. In 1542, however, a work appeared which is remarkable for its very fine woodcuts of plants. This is the *De Historia Stirpium* of Leonhard Fuchs, a German botanist, who is commemorated in the well-known fuchsia of our gardens. An excellent example of this work is in the Library.

Among the more notable of other pre-Linnæan authors whose works are at Kew may be mentioned William Turner, known as the "Father of English Botany," whose "Herbal" (1551-68) contains some fine examples of initial letters; John Gerard, who had a garden in Holborn and was the author of a famous "Herball," published first in 1597; and John Parkinson, *Paradisi in Sole* (1629 and 1656) and *Theatrum Botanicum* (1640). Of the numerous publications of R. J. Thornton at Kew, the most noteworthy is the sumptuous work entitled "A New Illustration of the Sexual System of Carolus von Linnæus," dated 1807, an imperial folio containing several portraits of celebrities, including some fine ones of Linnæus, and costly coloured engravings of many plants. Thornton in 1811 obtained an Act of Parliament to enable him to dispose of his collections of paintings, drawings, engravings, etc., by means of a lottery, called "The Royal Botanical Lottery, under the patronage of His Royal Highness the Prince Regent." There were 20,000 tickets at two guineas each, and 1,000 prizes said by Thornton to represent a total value of £77,000. He died a poor man, so it may be assumed that the lottery was not successful. A book extraordinary on account of its size is Bateman's "Orchidaceæ of Mexico and Guatemala," which stands 29½ inches high and is 21 inches broad. The fine coloured drawings of orchids are life-size. Only 125 copies of the work were issued. "Floras" are, as might be expected, a strong feature of the Library. These vary very considerably in size, value, and importance. By far the largest of all is the *Flora Brasiliensis*, which consists of forty part-volumes in folio,

weighs about a quarter of a ton, costs about £220, and took sixty-five years to elaborate.

A very valuable adjunct to the Library is the collection of prints and drawings of plants. They are mounted on large sheets of paper and preserved in portfolios. The total number of pictures so preserved is approximately 110,000. As an aid to the identification of plants, especially cultivated ones (which are the most frequently figured), they are exceedingly valuable; often, indeed, where the figures are coloured to nature, they are of more immediate service than the dried specimens.

Kew is not a teaching establishment, but the Herbarium and Library are at the disposal of persons engaged in original botanical research who satisfy the keeper as to their qualifications. But, for very obvious reasons, they are not open to the casual passer-by who for mere curiosity's sake would like to turn over the books, specimens, and drawings. Kew is visited by numerous botanists annually, many of whom reside in the neighbourhood for weeks or months at a time—some even for years—in order to be within convenient reach of the Herbarium. It is, naturally, used by British botanists more than by those of other nationalities, but after them come the Americans, Germans, and French. There is, however, scarcely a civilised nation which is not represented every year.



PEONIES IN JUNE

CHAPTER II

BOTANICAL WORKS AND PUBLICATIONS

ONE of the most important enterprises on which the scientific staff at Kew, with help from various outsiders, has been engaged, and for which the material in the Library and Herbarium has supplied the main foundation, is the complete elaboration of the vegetation of the British Empire. During his directorate Sir William Hooker projected a series of handbooks on the floras of all the British colonies and possessions. He suggested that they should be of a uniform type, and written in English, "scientific, yet intelligible to people of ordinary education." That was in 1857. Between the years 1829 and 1840, Sir William Hooker, whilst he was attached to Glasgow University, had himself written and published a "Flora of British North America" under the authority of the Colonial Secretary of the time. And during the period between 1843 and 1859 his son, Dr. (afterwards Sir) Joseph Hooker, published his *Flora Antarctica*, portions of which dealt with the vegetation of New Zealand, Tasmania, and minor Australasian possessions. Both these works were issued in quarto form, and were illustrated by numerous plates. Sir William's idea, however, was to produce a cheaper series of "Floras," uniform, more convenient in size, and without plates. His suggestions were adopted by the Colonial Office, and a commencement was made with a "Flora of the West Indies," by Dr. Grisebach. It was followed by the "Flora of Hong Kong," by Bentham; then came the "Flora of Australia," by the same author, an arduous task, begun in 1863 and finished in 1878. Neither of these botanists was attached to the Kew staff, but Bentham was in close association with it from 1854 up to his death in September, 1884. Sir Joseph Hooker published (1864-67) a "Handbook of the Flora of New Zealand," largely based on his previous work, but including cryptogams, and produced on the same plan as the volumes by Bentham and Grisebach. Mr. J. G. Baker,

first assistant in the Herbarium, prepared the "Flora of Mauritius and the Seychelles" (1877).

The most laborious and most monumental of these undertakings is the "Flora of British India," which science owes to Sir Joseph Hooker. The first part was issued in 1872, the last in 1897. This magnificent work deals with no fewer than 14,000 species, and although Sir Joseph had in their elaboration considerable assistance from other botanists, the greater part is exclusively his own work; and what was done by others had his revision. Although Sir Joseph Hooker was over eighty years of age when the "Flora of British India" was finished, he immediately set about the completion of the "Flora of Ceylon," which had been commenced by Dr. Trimen but was interrupted by his death. It was completed in 1900.

At the present time two large and important "Floras" are being prepared at Kew: the "Flora of Tropical Africa" and *Flora Capensis*, both under the editorship of Sir William African Floras. Thiselton-Dyer. The former was commenced by Professor Oliver, then keeper of the Herbarium, about 1867, but through various circumstances it fell into abeyance after three volumes had been published. The work was taken up again in 1892, and since 1897 has proceeded steadily. The *Flora Capensis*, too, has undergone certain vicissitudes. It deals with African plants found south of the tropic of Capricorn, and was commenced by Drs. Harvey and Sonder about 1861. Neither of these botanists was attached to Kew, and the death of Harvey in 1866 caused a cessation of the work. It was resumed at Kew in 1896, and parts have appeared at intervals.

Thus it will be seen that the vegetation of the greater portion of the British Empire has been, or is by way of being, classified and described in this noble series of volumes. How great a work it is, how involved and abstruse many of the problems encountered are, only those actually engaged in it may know. But the end in view—which is that anyone acquainted with the English language may, by these books, identify any plant found wild on British soil—is being largely attained. It can never, of course, be described as absolutely accomplished so long as plants may be discovered.

Very few periodicals, and possibly not a single illustrated one, can boast of an existence as long as that of the "Botanical Magazine."

It is well over a century since the first number was published, and it has appeared every month during that period. It is not an official publication from Kew, but for a great number of years has been closely associated with the establishment. Soon after its institution in 1787, the "Botanical Magazine" became the leading illustrated periodical devoted to botany and horticulture, and its circulation reached 3,200 copies. It published then, as it does now, descriptions and coloured pictures of new and interesting garden plants, and even of old ones of sufficient importance.

By the year 1827, owing to various vicissitudes and the rise of rival publications, it had fallen on less prosperous times. Its existence, indeed, had become precarious. That year, however, saw the beginning of a remarkable rise in its fortunes. The editorship was offered to and accepted by Sir William Hooker, at that time attached to the University of Glasgow. The energy and genius of its new editor, which soon became evident in whatever he undertook, inaugurated a new era of prosperity for the magazine. For several years he was not only editor but artist as well. About this time he became acquainted with a youth—Walter Fitch—who, by his native gifts and the tuition in technical matters which Hooker gave him, ultimately developed into the most talented and most famous botanical artist of his time. For this magazine alone he made about 1,600 plates. When Sir William Hooker removed from Glasgow to Kew in 1841, he still retained the editorship and, in fact, remained editor and chief author until his death in 1865. Thus began the intimate association of this magazine with Kew, which has lasted until now. Fitch also came to live at Kew, and here the greater part of his life's work was done. He died in Llewelyn House, on the south side of Kew Green, in 1892. Since 1841 the great majority of the "Botanical Magazine" plates have been prepared from plants that have flowered at Kew, and its successive editors have been past or present directors of Kew. Up to the present time it has published nearly 8,200 plates. It may safely be said that scarcely a single remarkable plant of exotic origin that has flowered in England is unfigured in the pages of the venerable "Botanical Magazine."

The *Icones Plantarum* of Sir William Hooker was commenced at Glasgow in 1837. It is devoted to the delineation and description of new and rare plants. Whilst the "Botanical Magazine" concerns

itself with cultivated garden plants, the plates in the *Icones* are prepared from dried material in the Herbarium. The figures are in outline and uncoloured. Up to Sir William Hooker's death, the plates were made from his herbarium exclusively, but since then the dried plants in the Kew Herbarium have been drawn upon generally. At the present time it is edited by the director, and the expense of preparing the plates is covered by the proceeds of a legacy left in trust by George Bentham. Up to the present, 2,850 plates have been published.

No account of the literary activity of Kew would be complete without some reference to the *Genera Plantarum* and the *Index Kewensis*. The first is the collaborated work of G. Bentham and Sir Joseph Hooker. It contains a description of every genus of flowering plants, arranged and classified in accordance with its natural affinities. It is the basis on which are founded the arrangement and nomenclature of the living plants, dried specimens, and most of the museum material at Kew. Some idea of the magnitude of this work may be gathered from the fact that it contains more than 3,500 pages of condensed descriptive matter in Latin, and that it occupied its authors nearly a quarter of a century.

The *Index Kewensis*, which is in a sense complementary to the preceding work, is an alphabetical list of all botanical names of plants, with a citation of the work, and a reference to the page, in which each name originally appeared. Its inception we owe to Charles Darwin, who in 1881 made arrangements to meet the expense of its preparation out of his own estate. The two original volumes, which include all names published up to 1885, were prepared at Kew by Mr. B. D. Jackson, with help from Sir Joseph Hooker. Such a work will never, of course, be complete, so long as new plants are discovered and new names given, but quinquennial supplements are prepared at Kew and published under the supervision of the director.

Since 1887 the official organ of Kew has been the "Bulletin of Miscellaneous Information." In this work is published information which comes to Kew in the course of official routine, and is likely to be of value and interest to the public. Much of it deals with economic plants, old and new, and their products, actual and prospective. It discusses the introduction of such plants to British colonies and possessions, their cultivation, the

Kew
Bulletin.

preparation and manufacture of their products, market prices, and allied matters. This, perhaps, is its chief function, but it also publishes descriptions of new plants and discusses diseases of plants. It records passing events at Kew and changes in *personnel*, describes new works and buildings, and gives notes on rare plants in the collections, etc. The volumes so far published contain a detailed history of Kew since the inception of the "Bulletin." Various appendices to the annual volumes are published, notably a list of all the new garden plants of the year. Separate volumes are also occasionally issued dealing with subjects of special importance, such as fibre-yielding plants, rubber plants, etc.

The first list of plants cultivated at Kew was published by Sir John Hill in 1768. A more important work, however, was the *Hortus Kewensis* of the elder Aiton, published in 1789. A second edition of this work was issued (1810-13) by the younger Aiton, who also, in 1814, published it in epitomised or catalogue form. After that no complete list of plants cultivated at Kew was published until 1894, when the issue of the "Kew Hand Lists" began. Each list deals with a distinct group of plants, such as ferns, orchids, herbaceous plants, hardy trees and shrubs, etc. The idea has been not only to show what plants may actually be seen at Kew, but, what is perhaps a more important consideration, to provide also a standard of nomenclature for cultivated plants. The extraordinary tangle in which the botanical naming of plants is involved has long been the despair of the ordinary cultivator who has not the technical knowledge to understand the reasons for it. The fact that some plants have been given half-a-dozen or more names, and that for each one of them an authority is to be found who will give it preference, inclines him to ignore them all. Yet it is most important, for ordinary purposes of trade and correspondence, that a plant should have a generally recognised name. It is not so important what name is used as that it shall be generally used. What Kew has done—and it is the only establishment in England with the requisite authority to do it—is to publish lists containing the proper name of every plant it cultivates; the name, that is, which it considers should be generally adopted. To this name synonyms are referred. The native country of each plant is recorded and, to fix its identity, a published figure is quoted when such exists. It is gratifying to be able to record that the influence of these Lists in

unifying the nomenclature of plants has already become very evident, although the process is inevitably slow.

As pertaining to the same end as the preparation and publication of the Hand Lists, there may be mentioned an unobtrusive work, yet one which entails a considerable expenditure of time on the part of the Kew staff. This is the identification and naming of plants sent by private cultivators. They come from every part of the United Kingdom. The work has an aspect of general utility apart from its advantages to the persons who send the plants. It aids in the great work of unifying the nomenclature of plants, for many of them come from leading trade establishments where a Kew-named plant will be regarded as a type. In a lesser degree the same holds good even as regards private gardens. During 1907 about 3,000 plants were so named at Kew.



THE LAKE IN AUTUMN
View looking North

CHAPTER III

THE JODRELL LABORATORY AND NORTH GALLERY

NOWADAYS the botanic garden is made to serve many purposes. Primarily, its business is to promote the knowledge of plants, their structure, functions, uses, and geographical distribution.

The Laboratory. In earlier times it was the morphology of the plant—its form and structure—that obtained the botanist's chief attention. That, perhaps, was inevitable whilst the classification of the vegetable kingdom was still being laboriously evolved, but, latterly, physiology—or the study of the processes going on within the plant itself—has engaged some of the most alert minds devoted to the investigation of plant-life.

It was to furnish facilities for this branch of study that the Laboratory was built. Kew owes its acquisition to the generosity of one man, Mr. T. J. Phillips Jodrell, who built and equipped it at his own expense in 1876. It is fitted with apparatus for the chemical analysis of vegetable organisms, for their microscopical study, anatomical research, photography, etc. The Laboratory stands in the private ground at the north end of the Herb Garden. It is a red-brick, one-storeyed building, and is not open to the general public. Since 1876, large numbers of botanists have carried out investigations in the Jodrell Laboratory, and many of their researches have been of great scientific interest and importance. The work has naturally ranged over various branches of botany, as will be shown by the following references to a few of the subjects dealt with.

A series of investigations (begun in 1893) of the structure of fossil plants, chiefly from the Coal Measures, has been carried out by Dr. D. H. Scott—at first in conjunction with the late Professor W. C. Williamson. Among the fossils studied, the most interesting were a series of plants with fern-like foliage, possessing an anatomical

structure intermediate between that of existing ferns and cycads. The results of this study of the structure of the vegetative organs indicated that this extinct group of plants was related to ferns on the one hand, and to cycads on the other. A result of far-reaching importance in relation to the physiological processes of living plants was obtained (1883) by Mr. Walter Gardiner, who proved that the cells composing the tissues of plants are not independent, but that the living protoplasm of one cell is connected with adjacent cells by fine threads of protoplasm penetrating the cell wall. An investigation, extending over four years, was made by Mr. Horace T. Brown and Professor F. Escombe of some of the physiological processes of green leaves. It threw light on several points concerning the passage of carbonic acid into the leaf and of water-vapour from the leaf, the absorption of radiant energy by the leaf, and the manner in which it is expended. Mr. G. Masee's researches deal with a large number of fungi, and developmental and experimental work connected with the numerous fungal diseases of plants.

On the roll of notable women of the later Victorian era, the name of Marianne North will occupy, if not a foremost, at least an honoured place. She was born at Hastings in 1830, and her father, **The North Gallery.** Mr. Frederick North, was at one time Member of Parliament for that borough. From her early youth she devoted her talents to flower painting; in later years it became the chief object and solace of her life. The picture gallery at Kew, her noble and enduring monument, is a remarkable illustration of what one woman's genius, courage, and industry can accomplish. Every one of the 848 paintings it contains is the work of her hand. The great majority of them were painted, not only in the country, but usually on the spot where the plants grew wild. The whole of these pictures were done between the years 1872 and 1885, and for the purpose of painting them she successively visited the following countries: North America, West Indies (especially Jamaica), Brazil, Teneriffe, California, Japan, Borneo, Java, Singapore, Ceylon, India and the Himalaya. After her return from India, she determined to present her paintings to the nation, and arrangements were made to erect at her own cost the present gallery at Kew. But to make the collection more complete she visited Australia, Tasmania, and New Zealand. Returning to England in 1881 with the results of

this journey, she then turned her attention to the arrangement of her pictures in the newly-built gallery. The considerable labour this involved was accomplished in time to open the gallery to the public on July 9th, 1882.

There still remained important areas of the globe whose floras were unrepresented in the gallery, and to make good these deficiencies as far as lay in her power, Miss North subsequently visited South Africa, Madagascar, Mauritius, the Seychelle Islands, and Chile. The South American journey, which occupied the autumn of 1884 and part of the following year, was her last. To furnish hanging room for her new works an annexe to the gallery had to be built. It was completed, and the pictures arranged therein, during the latter part of 1885. Miss North, who for some years had felt the effect of breaking health and increasing age, then retired to Alderley, in Gloucestershire, where, to use her own words, she had found "a quiet home in the country, with an old house and a garden to make after her own fashion." But she was not destined long to enjoy her retirement. Soon after she finished her work at Kew she was attacked by a painful illness which clouded the remainder of her life, and from the effects of which she died on August 30th, 1890.

The leading characteristic of Miss North's work is her fidelity to nature. Her object—somewhat different from that of most flower painters—was to reproduce her subject as faithfully and as exactly as possible. Thus the pictures of plants and flowers she made are not only artistically pleasing, they are botanically accurate. In a scientific establishment like Kew, this quality renders the drawings of infinite value. The gallery is, indeed, an important and valuable adjunct to the botanical collections. Nowhere else, perhaps, can the untravelled person gain so vivid an idea of the scenery and characteristic vegetation of the countries which Miss North visited. Of each country there is a long series of pictures, not only of individual plants and flowers, but of the forests, mountains, rivers, and waterfalls as well. Often the people, their temples and dwellings, are portrayed, and occasionally insect and animal life.

In 1882, Sir Joseph Hooker, himself a famous traveller, wrote :—
 "Very many of the views here brought together represent vividly and truthfully scenes of astonishing interest and singularity, and objects that are amongst the wonders of the vegetable kingdom ;

and though now accessible to travellers and familiar to readers of travels, are already disappearing, or are doomed to disappear, before the axe and the forest fires, the plough, and the flock, of the ever-advancing settler and colonist. Such scenes can never be renewed by Nature, nor when once effaced can they be pictured to the mind's eye, except by means of such records as these."



THE POND AND MUSEUM I.

CHAPTER IV

MUSEUMS

THE Museums at Kew—three in number—are intended to show, as well as their limits will permit, the uses of plants to mankind.

Here are exhibited not only the raw material furnished by the plant, but the finished product and illustrations of the processes of manufacture. It is an interesting fact that the first Museum of Economic Botany ever established was the present Museum No. II. at Kew. It soon had many imitators, not only at home, but in the colonies and foreign countries as well. The latest and most imposing of these was the Imperial Institute, so far as the sections devoted to plant products are concerned. Like nearly all the principal scientific features of Kew, it had its origin in the fertile brain of Sir William Hooker.

In 1846, as is elsewhere recorded, the present No. II. Museum with the adjacent ground—which up to that time had been a Royal kitchen-garden—was transferred to the Botanic Garden, and placed under Hooker's charge. The building had been used partly as a dwelling-house, partly as a fruit-room. It was then that Hooker conceived the idea of using it for the exhibition of the economic products of the vegetable world. A remarkable ignorance exists amongst ordinary people as to the origin of many of the commonest articles in daily use. A museum containing such things as fibres, dyes, drugs, foods, and so on, with material illustrating the processes of preparation or manufacture, and when possible the completed product also, all properly named and accompanied by explanatory notes, would certainly prove of great educational value to the community. That is the popular side. To the manufacturer, the chemist, the botanist, and physician it would have a still deeper interest and value. In an account of the life and labours of his father, Sir Joseph Hooker records the beginning of the Museums of Economic Botany at Kew. Sir William himself had a large collection of interesting objects which he had formed for the use of his class in Glasgow. Mr.

Smith, the curator, had others, and some appear to have been scattered about in the offices in the gardens. "Procuring a few trestles and planks, he formed of them a long table in the central room of the building, arranged all these articles on it, ticketed them, and invited the Commissioners [of Woods and Works] to come and see them. This they did (I happened to be present on the occasion), and listened to his eloquent discourse upon them, during which he showed how such a collection of vegetable products might, besides interesting and instructing the public, prove of great service to the scientific botanist, the physician, the merchant, the manufacturer, the chemist and druggist, the dyer, and to artisans of every description." Sir William's advocacy being effective, this building became transformed into a Museum of Economic Botany. It was opened to the public in 1848.

Contributions to the Museum soon became so plentiful that room could no longer be found for them. The building of a second museum was therefore decided on. This, which was completed and opened to the public in 1857, is the present Museum No. I., standing on the side of the Pond opposite to the Palm House. In 1881, owing to the transference to Kew from the India Museum at South Kensington of the entire collection of specimens illustrating the economic botany of India, a new wing had to be added to this building for its accommodation. The contents of the museums have been largely reinforced by the acquisition of specimens from the London Exhibitions of 1851 and 1862, and from the Colonial and Indian Exhibition of 1886. The exhibitions held in Paris in 1855, 1867, and later, were the source also of many valuable additions. Various provincial exhibitions have from time to time been drawn upon, and every opportunity is still taken to enrich the collections by purchase or gift. A valuable and interesting feature is the series of specimens contributed by many leading firms, showing processes of manufacture. Private travellers, His Majesty's Consuls, and officials in Colonial Botanic Gardens, have all rendered valuable help.

The arrangement of the specimens in Museums I. and II. is botanical. No. I. is devoted to the great class of flowering plants known as Dicotyledons; No. II. to the Monocotyledons and the various groups of non-flowering plants, such as ferns, mosses, lichens, fungi, etc. The members of a genus and the genera of a natural order are also brought together. This arrangement is not only convenient as affording the

readiest means of tracing a given specimen ; it is also found that, owing to the frequent similarity in the natural products of botanically related plants, it has often the effect of grouping together specimens of an allied character. The two important fibres, ramie and hemp, are examples ; both belong to and will here be found under Urticacæ—the Nettle Order.

In Museum No. I. the arrangement of the specimens begins on the top floor with the products obtained from members of the natural order Ranunculacæ. It continues through the middle floor to the bottom one, where it ends with articles derived from poplars and willows. The objects are arranged in double-fronted cases 9 feet long, 2 feet 9 inches deep, and about 8 feet high. Each case is fitted with movable shelves, and is divided lengthwise, by a partition, into two compartments.

To give some idea of the character of the exhibits, it will be best to describe those connected with some typical product. Opium may be selected as an example. This drug is obtained from a species of poppy (*Papaver somniferum*) by incising the young seed-pods, and collecting the milky juice which exudes through the cut. In the Museum there is a picture of the plant and an exhibit of dried poppy-heads. These give an idea of the plant itself. There are also pictures illustrating the various field operations connected with the cultivation of this poppy, from the preparation of the ground for seed-sowing to the puncturing of the poppy-head and the harvesting. Then come specimens of the actual utensils used in the manufacture of the raw material, and samples of the various forms in which opium is taken to market in different countries. A complete smoking apparatus (pipe, lamp, etc.) illustrates one well-known method of employing this drug ; and there are models of recumbent figures on couches, showing the position the opium smoker usually adopts. Opium is used in many other ways. Various narcotics of great value in medicine are derived from it, such as laudanum and morphia, and samples of these are also exhibited.

Taking at random a few other examples, we have cotton, jute, tobacco, Japanese lacquer, innumerable oils, essences, perfumes, etc., illustrated by raw material and finished articles. In the willow family, various stages in the manufacture of cricket bats are shown, and there are exhibited some interesting Exchequer tallies formerly used as receipts for payments made. It would, indeed, be difficult

to point to any single use to which plants are put which is not in some way illustrated here. Even the modest genius of some rural Izaak Walton, who adapted blackthorn spines into fish-hooks, does not go unrecognised. Curious facts connected with various products are brought out, such, for instance, as the packing of Paraguay tea by South Americans in the skins of animals, here illustrated by an entire skin of the great ant-eater packed with this substance. Ravages by insects are shown by specimens of the insect itself, an explanation of its life-history, and examples of the damage done.

Of miscellaneous objects, the most important is a collection of portraits of famous botanists. The nucleus of this collection was formed by Sir William Hooker, and was purchased after his death by the Government. It consists of oil-paintings, miniatures, drawings, engravings, medallions, photographs, and marble busts. There are many models of plants, flowers, and fruits, the most remarkable of which is a model of the flower of *Rafflesia Arnoldi*, a strange parasitic plant found in the depths of Sumatran forests. The flower is three feet in diameter, of circular form, and has thick fleshy petals.

Museum No. II., being devoted chiefly to monocotyledonous plants, is largely occupied by purely tropical products. Owing to the irregular construction of the building, the shape and arrangement of the cases are different from those of Museum No. I.; nor are they of a uniform type. Of all tropical trees, palms are the most important, affording, as they do, food, drink, shelter, and clothing to the native races of the countries in which they grow. They naturally occupy, therefore, more space in this Museum than any other family.

The methods of illustration are the same as in No. I. Museum, and no better example can be taken than the cocoa-nut palm. Here are pictures showing the tree as it grows near the sea in tropical countries, also a portion of the trunk and a bunch of nuts in their husks just as they come from the tree. Then come examples of the almost innumerable things made from this most valuable of all palms. There are samples of cocoa-nut oil, with soap and candles made of it; sugar and vinegar made from the sap of the tree; walking-sticks and ornamental articles from the wood; various toys and utensils, such as teapots, cups, and ladles, from the shell of the nut; and samples of the kernels, now largely used in confectionery. There still remain the many articles made from the



THE OLD ORANGERY : NOW MUSEUM III.

strong fibre of which the husk is composed, such as mats and matting, ropes and rough cord, hand-bags, and brushes. Finally, one may see various articles of dress and ornament made from one part or another by native races in the tropics.

Whilst the cocoa-nut palm is the most important, the products of many other palms are here to be seen—the date palm, ivory palm, oil palm, and so on,—living specimens of which are in the Palm House. In this museum, also, are exhibited samples of the various cereals which constitute the staple food of northern races—wheat, barley, rye, and oats—as well as sugar and rice; esparto grass, now so largely used for paper-making; models of fungi, edible and poisonous; and many other objects of singular interest obtained from the lower types of vegetation—seaweeds, lichens, ferns, and mosses.

Museum No. II. is situated near the north end of the Broad Walk, and is the second building met with on entering the Gardens from Kew Green. It is mainly devoted to the exhibition of specimens of timber, or to wooden articles of use and ornament. Every area of the globe where trees grow, whether temperate or tropical, has been drawn upon, and the specimens are arranged according to the geographical distribution of the trees from which they were obtained. Whilst these constitute its largest and most important feature, the Museum also houses a very miscellaneous collection of interesting material. There is a comprehensive series of plans and views of Kew, both past and present, old and new. Many of the features in the Kew and Richmond gardens of the eighteenth century, now long disappeared, are here illustrated by old engravings, such as the “New” Palace, Kew House, Mosque, Hermitage, Merlin’s Cave, and other buildings. Some of these pictures have been reproduced for this work. Kew as it is to-day is also shown by many illustrations—notably by a series of fine photographs taken for the Paris Exhibition of 1900. There are several beautiful examples of Indian woodwork, and many other curious objects of art and nature are on view. In 1902 some sheds at the back of this museum were made into an annexe, with an opening into the main building at each end. This is devoted chiefly to the display of material connected with the natural order of conifers. A splendid collection of cones is an important adjunct to the Pinetum for the study of these trees. A similar collection of cones belonging to the allied, but mainly tropical, order of cycads is also shown.

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*Museum No. II. The British Forestry Museum,
in Cambridge College. 1910.*

PART IV
*PLANT COLLECTIONS (TROPICAL AND WARM
TEMPERATE)*

CHAPTER I

THE PALM HOUSE

ADDED to its own peculiar beauty of colour and form, plant-life in the tropics has for people of cool countries that other attraction which

Tropical Vegetation. always belongs to the uncommon or the unknown. There is nothing in the flora of the British Isles that suggests to the inexperienced eye the prevailing types of tropical vegetation as they are represented in this house—the palms, banana trees, cycads, screw-pines, and the giant bamboos. From the oaks and elms, the shrubs and flowers of the open air, it is a very different world one enters here. Forgetting this, those of us whose curiosity has been dulled by habit and familiarity are apt to be surprised at the crowds of people who go perspiring through this house on the hottest of summer days.

The greatest difference between tropical vegetation as represented in the Palm House and that of Great Britain is the extraordinary development in the tropics of that great division of **Endogens.** flowering plants commonly known as the endogens, but more properly as monocotyledons. In this great group the veins of the leaves are straight and parallel, and the stem does not increase in thickness by the addition of external layers as happens with the trees of northern Europe. The stems of woody monocotyledons do not increase in diameter indefinitely. Those of even the tallest palms and bamboos in this house, it will be noticed, are almost as thick towards the top as they are near the bottom. The only woody monocotyledon found wild in Britain is the butcher's broom, an uncommon shrub two to three feet high, belonging to the lily family. It is a far cry from this, or the tallest of British grasses and rushes, to the monster palms, screw-pines, and bamboos of the tropical forest.

There is no cause to wonder, then, at the popular interest in this house.

As far back as the reign of George III., long before Kew became a public institution, the erection of a large house for palms had been contemplated. In 1834, again, at the instance of William IV., the matter got so far as the preparation of a plan for a palm house by Sir Jeffrey Wyatville. Nothing further, however, was done until after the gardens were transferred to the people by Queen Victoria. Then one of the first objects to which Sir William Hooker devoted his energy was the acquisition for the gardens of a palm house worthy of the nation. Through the influence of powerful friends of Kew he succeeded.

History of
the Palm
House.

The design for the building was made by Mr. Decimus Burton, and its erection was commenced in 1844. Completed in 1848, it is, with the exception of the Aroid House (No. 1), the oldest plant-house in Kew. Glass-houses are not often things of beauty; their external attractiveness is, in fact, usually in inverse ratio to their suitability for growing plants. The Palm House at Kew, even now, is one of the very finest plant-houses in the world. Its graceful lines and admirable proportions make it as pleasing to the eye as it is possible for a structure of glass and iron to be. It is the central point of Kew, the spot upon which all the main routes converge. Its total length is 362 feet; the transept is 100 feet wide and 66 feet high; and the wings are each 50 feet wide and 30 feet high.

Character
and
Dimensions.

In regard to the admission of light, now recognised as one of the most important factors in greenhouse construction, this house must have marked a great advance on the heavy, often dark, structures of its time. Yet if it were possible to substitute wider panes of glass, it would be an improvement, as would also be the substitution of clear glass for the green. Internally, too, the arrangements could no doubt be considerably improved. Were it to be erected to-day more accommodation would be provided for growing the plants in beds of soil instead of in tubs and pots. When first built, no provision at all was made for this method of cultivation, but, as occasion has served, beds have been constructed in which the roots of strong-growing palms, etc., can have free play. The house is heated by six horizontal boilers situated in two large stokeholds under the central part.

Light and
Heating.

The chief difficulty in a house of this size, kept at so high a temperature, is to maintain an atmosphere sufficiently humid. No single condition, perhaps, in a tropical house, is of so much importance in regard to the health of the plants. It is secured by frequent damping of floors, stages, etc.

The large plants in this house are in remarkably vigorous health. Many of them are the finest of their kind in Europe. But there is always a certain antagonism between the large plants and the small in a house of such dimensions as this.

Undergrowth. Plants in glass-houses almost invariably thrive best near the roof glass, and here, where many of the plants in the central beds are fifty or sixty feet away from it, it means that the conditions are exceedingly unfavourable for them. It is a matter of considerable difficulty to find plants that will make a permanent undergrowth in this part of the house, and when such plants are found they are not only few in number, but often lacking in attractive qualities also. The system now largely relied on is to furnish these beds every spring with the surplus plants from other tropical houses. They succeed very well during the light summer months, but many, of course, succumb during the winter. The general visitor, however, is more concerned with the giants of the house and the more notable plants, many of which, it should be mentioned, are better seen from the gallery than from elsewhere.

The palms are seen to best advantage in the centre of the house, where, planted in beds of soil, they attain the finest development possible under glass. The long, straight, columnar trunks, marked every two or three inches with the ringed scars of fallen leaves, and bearing at the summit a crown of fan- or plume-like leaves, have a purely tropical aspect. Here is growing a specimen of *Sabal Blackburniana*, interesting as being the oldest palm in Kew. It was a fine specimen as long ago as 1820, and is believed to have been brought to Kew in 1793 by Admiral Bligh on his return from the famous voyage during which he succeeded in introducing the bread-fruit tree to the West Indies from the islands of the Pacific. It is a fan-leaved palm, and often bears great crops of black, grape-like fruit.

There are two plants of the cocoa-nut palm, the tree which produces the cocoa-nut of the coster's barrow. The larger one has a trunk six feet high and one foot in diameter. Although so common



A VIEW IN THE PALM HOUSE.

a tree near the sea shores of the tropics, it has always proved a somewhat difficult palm to cultivate. A still more notable triumph

**Cocoa-nut
Palms.**

in horticultural skill is a plant of the double cocoa-nut (*Lodoicea Seychellarum*). Although not yet large, it is the finest specimen ever raised in Britain. This remark-

able palm grows only in the Seychelles, a group of islands in the Indian Ocean. Its nuts were found floating on the sea by mariners long before the discovery of the islands, and for many years they were believed to be the fruit of a submarine plant. A single nut sometimes weighs over thirty pounds, and from five to ten of them are produced in a bunch. The species requires such careful cultivation during germination and the early stages of growth that very few plants in Great Britain have ever produced a single leaf. The nut from which this plant was raised is still attached to its base. Another cultural success is a specimen of the Doum, or gingerbread palm of Upper Egypt.

It would occupy too much space to allude to one-tenth of the representatives of the wonderful group of trees which are growing

**Remarkable
Palms.**

here. Bare mention can only be made of a few :—The ivory palm, a tree whose nuts are used as a substitute for animal ivory ; species of *Cocos* and *Howea*, reaching

nearly to the roof ; the slender, exceedingly graceful *Chamædoreas* ; the fan-leaved *Thrinaxes* and *Livistonas* ; the rare *Bismarckia nobilis* from Madagascar ; the remarkable *Attalea Cohune*, which has not yet commenced to form a stem, but whose leaves reach from the ground to the roof forty feet above ; the sugar and wax palms ; and the noble-leaved *Pritchardias* from Fiji. Whilst the trunks can best be seen from the floor, the gallery should be visited to get a fair idea of the magnificent foliage of these tropical palms.

Entering the house from the south end, the visitor's notice is first attracted by the fine cycads. These plants are found exclusively

Cycads.

in tropical and subtropical countries, and form a curious natural order (*Cycadaceæ*), having some affinity to the pine and fir family. They are, however, more palm-like in general appearance, many of them having a thick erect stem crowned with several tiers of wide-spreading, rigid, pinnate leaves. These stems grow very slowly in height. Among them a South African genus (*Encephalartos*) stands out conspicuously. There is a plant of *E. Caffer*, which was introduced by Masson from South Africa in 1775, and even now

its stem is but eight feet high. It produced a male cone in 1819, an event of such interest at that time that it brought Sir Joseph Banks to Kew specially to see it—a visit which proved to be his last. A remarkable species is *E. horridus*, with the leaf divisions cut up into spiny lobes. Noblest of all, however, is *E. Altensteinii*, of which there is one specimen with leaves nine feet long. Three species of *Dioon*, a Mexican genus, make a handsome group distinguishable always by the flat, comb-like arrangements of the leaf divisions. Specimens of *Cycas* from tropical Asia, and others of *Macrozamia* from Australia, help to form a collection which has no rival anywhere in Europe, either in the number of species it comprises or in the size and beauty of the individual specimens.

At the north end of the house the most striking feature is a group of those strange plants known to botanists under the generic name of *Pandanus*, and commonly spoken of as screw-pines. These
 Screw-
 Pines. plants have long, narrow, spirally-arranged leaves, and are supported mainly on stiff aërial roots which, as the plant grows and spreads, are continually being developed from the branches. They grow downwards until they enter the soil, when they help to prop up the branches and do their part also in supplying the tree with sustenance. In some instances the plants are entirely supported by these stilt-like roots.

Near each staircase leading to the gallery is a giant bamboo. The finer one of these—*Dendrocalamus giganteus*, from the Malay Archipelago,—although it does not rival the bamboos as seen in their native forests, has stems one foot in circumference.

Bananas have long been successfully grown here, and fine bunches of fruit are borne every year. The splendid foliage, too, is always a source of admiration. Provided space and head-
 Bananas,
 Coffee, etc. room be plentiful, their cultivation is easy. They require a tropical heat, abundant atmospheric and root moisture, and they should be planted in rich loam where the roots have ample space. Among other plants of great value to mankind that are growing in this house may be mentioned :—Coffee-trees, which bear fruit regularly; cocoa; durian; *Carludovica palmata*, the plant from whose leaves Panama hats are made; and the famous “traveller’s tree” of Madagascar (*Ravenala madagascariensis*), a plant with noble leaves, in the sheathing bases of which water to the amount of a pint or quart collects and keeps pure. Many of

the palms, too, are exceedingly useful plants, yielding oils, fibres, wax, etc.

Nothing contributes more to the tropical aspect of the house than its climbing plants. Some of the palm trunks in the centre of the house are clothed with them. Most remarkable of all, perhaps, are the examples of *Calamus*, climbing palms which

Climbers. thrust their way through other trees and hold their place securely by numerous recurving hooks on the leaves. They grow to extraordinary lengths, yet are scarcely ever much thicker than a walking-stick. In Museum II. there is a specimen which is 123 yards long. Very striking also are *Monstera deliciosa*, with large, handsomely-cut, perforated leaves, *Philodendrons*, climbing fig-trees, and species of *Vitis*. Reaching from the gallery to the roof in one long loop is a climbing plant which suggests the lianas of an equatorial forest; it is *Lonchocarpus Barteri*, from tropical Africa.

A peculiarly exotic and effective type of vegetation is that of a tall, slender stem, naked except at the top, where it is crowned by a mass of foliage. The palms themselves, of course, are the commonest examples, but there are others of the dicotyledonous class also frequent in this house, such as *Clavija*, *Theophrasta*, *Grias*, and *Sterculia*.

CHAPTER II

AROIDS, STOVE PLANTS AND NEPENTHES

ENTERING the Gardens by the chief entrance on Kew Green, the visitor will notice a plant-house immediately on his right. This is now the oldest structure in Kew devoted to the cultivation of plants. It originally stood in the grounds of Buckingham Palace, and was removed thence to the spot on which it now stands by William IV. in 1836. It represents a type of plant-house very characteristic of its time—heavy, solid, and dark—built with much more regard to the ideas of the architect than to those of the gardener. William IV. contemplated the erection of a large Palm House at Kew about 1834, but, the idea being for the time abandoned, this house at first served as a substitute. On the completion of the present Palm House in 1848, its contents were removed thither. It was then used for the cultivation of Australian plants, which in their turn were taken in 1863 to the newly finished Winter Garden. Ever since it has been filled with the shade-loving denizens of the tropical forest—which is, perhaps, the most appropriate use to which it could be put.

This house contains, in fact, the best reproduction which Britain—or even Europe—can show of a certain type of vegetation seen only in the humid depths of tropical forests. It is rather
The Forest Floor. the floor of the forest than the forest itself. It is only in the equatorial belt, where the atmosphere is very hot and laden with moisture, and where a certain amount of shade prevails, that such a vegetation as this exists. The tree-ferns, the tall palms of extremely slender stem, the rampant climbers, all these are eminently characteristic of such areas, and equally so is the natural order of plants known as the aroids, which constitute the majority in this house and give to it its name. The aroids are represented in the flora of Great Britain by the “cuckoo-pint,” or “lords and ladies,” and several others are hardy there,

such as the "friar's cowl" of the Mediterranean region and the *Arisæma* or "Indian turnip" of North America. Still, the order is mainly tropical, and its members vary in habit from low-growing plants to tall climbers.

In this house the genus most strongly represented is *Anthurium*, many species of which have exceedingly handsome leaves, remarkable not only for size but for colouring also. They often **Anthurium.** take the form of a shield, and some of the finest are from four feet to five feet long; others, of a more heart-shaped outline, are from one foot to two feet wide. Some members of this genus are valued also for their brilliantly-coloured inflorescence. Several fine specimens of the giant fern—*Angiopteris*—are prominent features, as is also *Amherstia nobilis*, one of the most gorgeous of tropical trees when in flower.

But more suggestively tropical than anything else is the climbing vegetation that covers the pillars and walls. The most remarkable of these climbers are the rampant *Philodendrons*, reaching **Philodendron.** ing to and across the roof, some of them with innumerable aerial roots hanging down like cords a dozen feet or more from the stems. Then there are strong-growing plants like *Monstera*, with finely-cut leaves, and curious clinging plants like *Pothos* and *Marcgraavia*, whose leaves press flat against the wall and whose roots suck its damp surface.

Palms, too, grow here, but they are very different from the burly giants of the Palm House. They are chiefly *Chamædoreas* and *Calamus*, some of them with stems two-thirds the height of the house, but varying in thickness from that of a lead pencil to that of a stout cudgel, and crowned with a graceful tier of leaves.

The Stove, a compartment of the T-Range, is devoted to the cultivation of purely tropical plants of the same character as those in the Aroid House and Palm House, but smaller, less **The Stove.** robust, and requiring more careful treatment. Here, and in the next compartment (No. 10), are grown most of the *Bromeliads*—a curious order of plants, many of them epiphytes, to which the pine-apple belongs. The choicer palms and the more highly-coloured aroids are grown here. Indeed, a large proportion of the plants are chiefly notable for the beauty of their foliage, although some, such as the *Allamandas*, make brilliant floral displays.

Next to the Stove is the *Begonia* House (No. 8), which is kept at

a somewhat lower—or “warm greenhouse”—temperature. Its contents are of a more flowery character than those of the Stove. It is largely given up to the extensive and ornamental genus *Begonia* after which it is named. *Begonias* inhabit the tropics of both the New and Old Worlds, and are almost invariably distinguished by a greater or less degree of obliquity in the leaf. The genus was first represented in England, and probably in Europe, by a species (*Begonia nitida*) introduced from Jamaica to Kew in 1777. In recent years the *begonias* have become more important than ever in gardens. The tuberous-rooted sorts and their hybrids are growing very popular for summer bedding, and a species introduced from Socotra to Kew in 1880 (*B. socotrana*) has, by hybridisation, given birth to one of the most valuable groups of winter-flowering greenhouse plants we possess.

Whilst *begonias* fill the most important place in this house, room is also found for a succession of other interesting and beautiful flowering plants. Many tropical bulbous plants may be seen in blossom here during the year, such as *Hymenocallis* and *Pancratium*; many gesneraceous ones like *Gesnera* and *Gloxinia*; and many of the *Acanthaceæ*, a well-marked order of great beauty. A large proportion of these are grown in private plant-houses, and only kept here whilst in flower.

Inhabiting many of the islands and promontories on the Indian Ocean, but most abundant in Borneo, is the remarkable group of plants known to botanists as *Nepenthes*. They are nearly always found in the hot, damp recesses of the virgin forest, and require under cultivation a more intensely tropical treatment than almost any other group of plants. The *Nepenthes* House at Kew, which runs parallel to and is entered from the compartment of the T-Range known as the Stove, was specially built for their accommodation in 1897. It is 70 feet long, 12 feet wide, and 9½ feet high, and the pitcher plants are grown in wooden baskets suspended from the roof.

Although in nature the *Nepenthes* are climbers, in cultivation it is found that the best way to secure fine pitchers is to keep the plants dwarfed. At Kew they are cut back, almost to the base of the old growths, early in the year, and when about half-a-dozen pitcher-bearing leaves have developed on the young shoots, the latter have their tops cut off to prevent them from growing taller. The

vigour of the plant is thus concentrated on the pitchers that remain, for it is in these that the beauty and interest of the plants are centred, the flowers being unattractive. These pitchers are really a wonderful development of the elongated midrib of the leaf. Their purpose is to collect water, possibly as a reservoir to draw on in times of scarcity, but also to drown insects and supply the plant with nitrogenous material drawn from their decaying bodies. Small animals, attracted, no doubt, by the water, have been found entrapped in these pitchers. Under cultivation it is necessary that the pitchers should be partially filled with water in order to keep them fresh and in colour, but the supply of nitrogen to the plant is effected by the prosaic method of giving manure-water to the roots.

Besides its interest as the home of a remarkable group of tropical plants, this house affords a very instructive example of an unusual method of cultivating stove-plants. As the *Nepenthes* are suspended in baskets from the roof, the whole floor of the house not occupied by the path is free for the accommodation of other plants. Advantage was taken of this opportunity to adopt a freer and more natural style of gardening than is usual in hothouses. A kind of rockwork was built against the side walls, and on it was planted a choice selection of stove-plants with beautiful foliage. Here they thrive in a remarkable way, developing a beauty superior to that of the best pot-grown specimens. Along the roof are trained climbers with beautiful foliage or flowers. Seen at its best, when the *Nepenthes* are bearing their full crop of pitchers, and the other plants are in the full tide of growth—which is from June to September—this house is one of the most noteworthy features of Kew. The eternal red pot, the stiff, ugly staging, and many other accessories of the ordinary hothouse, are absent. It approaches as near the ideal of the more refined tropical gardening as is possible where such things as brick walls, glass roofs, and hot-water pipes are inevitable factors. The Palm House, of course, represents a grander phase of tropical gardening under glass, but the cultivation of dwarf, highly-coloured plants such as are grown with the *Nepenthes* is quite impossible in a house of that height and size.

A Successful Mode of Culture.

CHAPTER III

ORCHIDS

FUTURE chroniclers will probably consider the popularity of the orchid family in the gardens of Europe, but especially of England,

Belgium, and France, as the most notable characteristic in the horticultural history of the present era.

Present Popularity. There are several reasons for this popularity. The chief one is, perhaps, the remarkable structure of orchid flowers, combined with a striking if often bizarre beauty. The wonderful contrivances to secure cross-fertilisation by the insects that visit the flowers are not only a source of surpassing interest to naturalists who can study and see their meaning ; they result in such remarkable modifications in flower structure that the layman's eye is attracted also. The fact, too, that many grow high overhead in their native forests, on the branches and in the forks of trees, with little or no humus into which to send their roots, gives them an extraordinary interest to people whose experience of plant-life has been confined to terrestrial vegetation. That a plant should grow, thrive, and flower on a piece of wood suspended in a glass-house, is as astonishing to one who sees it for the first time as ever its flowers can be.

The public interest in orchids is undoubtedly stimulated also by the announcement of enormous prices frequently obtained for certain rare kinds. Such prices are, of course, far beyond the intrinsic value of the plant ; they are analogous to those given for rare postage-stamps or uncommon first editions. It is always the rarity of the plant, much more than its beauty, that decides its value. In one case it may be the white variety of a species with flowers normally coloured that is valued ; in another a spotted or coloured variety of one normally white.

During the last generation a noticeable change has occurred in the attitude of cultivators towards orchids in general. The old collector-spirit is dying out. Then, it was the wild species that were sought after, and collections of orchids were made up

almost entirely of them. The professional collector is still busy stripping orchids from the trees of the Andes and elsewhere, and shipping them home, but his labours are confined to fewer species, these being the showier and more easily cultivated ones like *Odontoglossum crispum*. But he has now a rival who is rapidly ousting him from his position as the primary agent through whom the orchid houses of Europe are kept replenished. The hybridiser is everywhere at work. It is safe to say that there are at the present time millions of orchids in the gardens and nurseries of Europe which have been raised from home-saved seed, and it is equally safe to predict that in the not distant future the majority of the orchids in hothouses will be of artificial origin. The raising of orchids from seed is a fascinating pursuit. As each young plant reaches maturity, and is about to flower for the first time, there is always the exciting possibility that it may turn out to be something quite distinct from anything the world has seen before. And hybrid orchids are now known to have one other great point in their favour: they are almost invariably of stronger constitution and more easily cultivated than their parents.

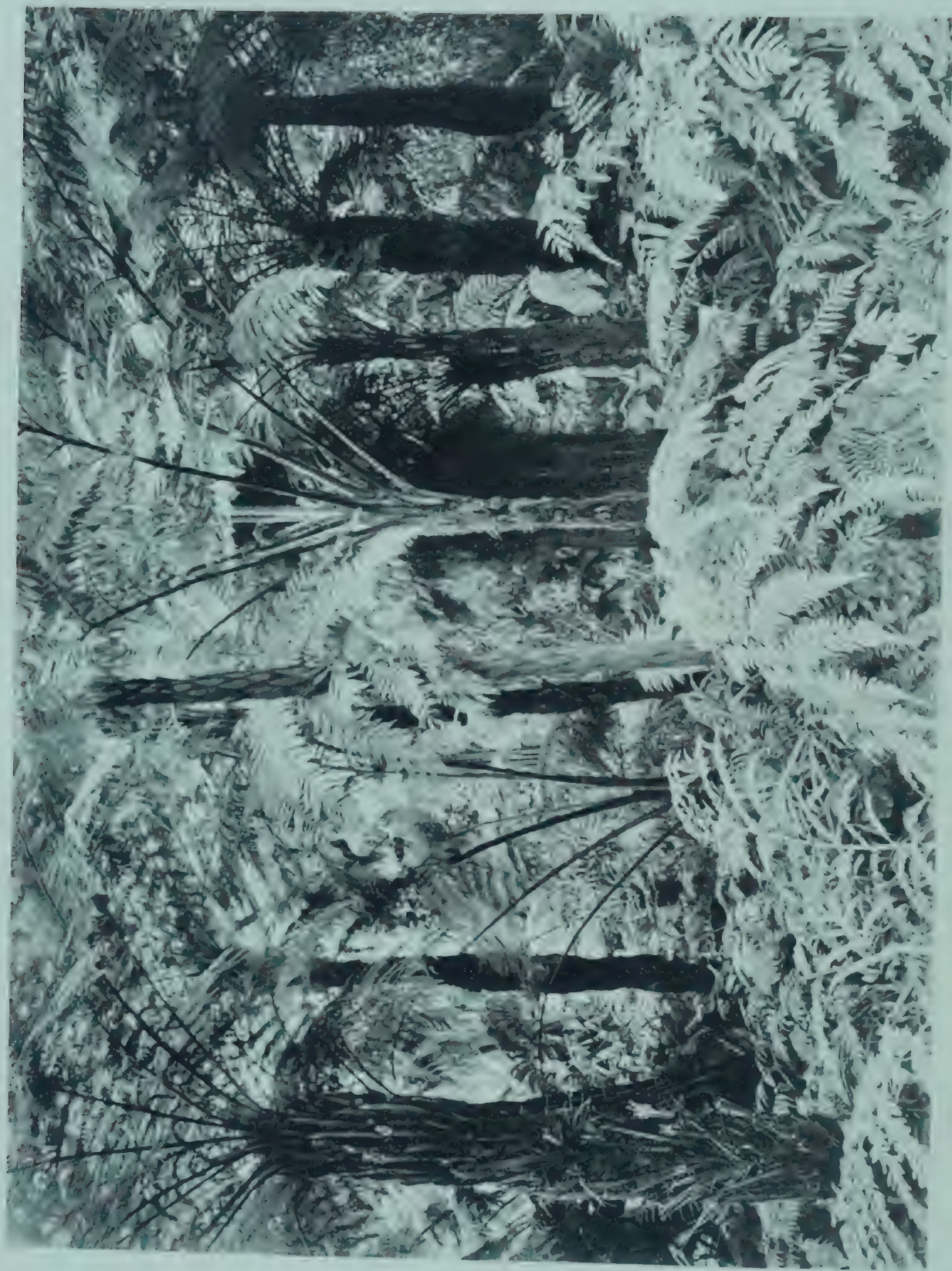
Kew, however, has never concerned itself deeply with these cross-bred orchids. Of surpassing interest in the early days of hybridising, they, as individuals, are rapidly becoming of as little scientific importance as members of the commoner races of garden plants like begonias or rhododendrons. With comparatively few exceptions, it is the pure wild types that are treasured at Kew. This side of orchid cultivation becomes all the more important now that the private cultivator is neglecting it more and more.

The first exotic orchid was introduced into Great Britain from the Bahamas in 1731. It was *Bletia verecunda*, a species that still finds a place in the Kew collection. In 1789 the number of exotic species cultivated here was fifteen. By 1813 they had increased to eighty-four. It was not until 1830 that any great interest was taken in orchids by private cultivators. But after that date a rapid increase in the number of species introduced into England took place. By 1850 the collection at Kew had grown to 830 species. At the present time, including the comparatively few British ones, it contains somewhere about 1,800. Considering the small amount of space there is at Kew to accommodate this large number of distinct types, it

Hybrid
Orchids.

Growth
of the
Collection.

is evident that the number of individual plants of each has to be severely limited. This has to apply to even the showiest of them. In consequence, the Orchid Houses do not always present that brilliantly gay appearance which people associate with these structures, but which is only possible where the finest species and hybrids alone are grown. On the other hand, a large number of species flower at Kew every year that cannot be seen elsewhere. It is not, perhaps, generally known that there are orchids with as little beauty of flower as the duller weeds by the wayside. Yet many of these, in their remarkable mechanical contrivances to secure cross-fertilisation by insects, have as deep a scientific interest as the gaudiest or most costly. It is impossible in these pages to deal with the Kew orchids in any detail. They are grown chiefly in the east wing (Nos. 13 and 14) of the T-Range, and in a series of pits in a private yard close by. Owing to the excessively humid atmosphere which at certain seasons is essential to their proper cultivation, they are not suitable plants for houses open to the public where doors are continually being opened and cold draughts admitted. It is only a small proportion of the species, therefore, that is exhibited at any one time. The houses open to the public are used for the display of species in flower, and for growing those of more robust constitution only.



TREE FERNS IN THE WINTER GARDEN.

CHAPTER IV

FERNS

KEW has for over half-a-century been the headquarters of fern cultivation. Sir William Hooker was for many years the leading authority on the botany of ferns, and he was ably seconded by Mr. J. Smith, the first curator, not only as a cultivator, but in scientific insight also. After Hooker's death in 1865, Mr. J. G. Baker, F.R.S., late keeper of the Kew Herbarium, took his place as the leading authority, and their joint work, the *Synopsis Filicum*, published in 1868, is still the one on which the nomenclature of ferns is based. Although the collection at Kew is richer and more comprehensive now than ever it was before, ferns do not fill quite so conspicuous a place in the horticultural world as they did about 1850. They were never so eagerly sought after as orchids are now, but a collection of ferns was a frequent feature in gardens of the mid-Victorian period. They still hold a very important position in glass-house gardening, but this position is utilitarian only, that is to say, they are grown for their decorative value merely. The collector's ideal of getting together as many types as possible has disappeared. It is on the collections of Kew, and in a lesser degree of similar establishments, therefore, that the student of ferns has to rely for much of his material. Many species are not to be found in cultivation elsewhere.

In the "Epitome of the Hortus Kewensis," published by W. T. Aiton in 1814, about 115 species of ferns are enumerated. By 1822 the exotic species, previously about eighty, had become reduced by one-half, and these were scattered about in various houses. John Smith, however, who was then foreman, brought them together in a lean-to house, which partly covered the site of the present tropical fernery. This may be said to have constituted the nucleus of the collection of ferns which afterwards attained such magnificent dimensions, for from that time it gradually increased in size and

importance. In 1845 it comprised 378 species; by 1856 the number had increased to 504. Twelve years later, in a list prepared by Mr. Baker, 802 species and varieties are included, and 48 allies of ferns. In 1895 the collection—exclusive of British ferns—contained 1,116 species and varieties, and at about this number it still remains.

The bulk of the collection is contained in two houses: No. 2 (tropical) and No. 3 (temperate). A certain number—mostly tropical

The Fern Houses. tree-ferns—are housed in the Aroid House (No. 1), and the larger temperate tree-ferns are planted in the

Winter Garden. The hardy ferns are to be found in the Rock Garden, on the slopes of the mound covering the old ice-well, and on the margins of the Wild Garden near the Temple of Æolus.

The chief Fern House (No. 2) first took its present form in 1868; but it dates back to 1843-5, during which period it was constructed by enlarging two old “lean-to” houses that stood on the same site. The south wing, originally a separate house built in 1861, was joined on to the main structure in 1868. The newly-constructed house of 1845 was at first filled chiefly with a collection of orchids which had been presented to Queen Victoria by the Duke of Bedford, and by her Majesty transferred to Kew. These orchids, described at the time as forming “a rich and inestimable collection,” do not appear to have succeeded here, and the house was ultimately given up to ferns. Between 1889 and 1892 it was rebuilt in its present form, the ventilating lantern was added, and the green glass, which had been in use for over forty years, replaced by the ordinary clear kind. It is now 129 feet long, 34 feet broad, and 15 feet high; the wing is 40 feet long, 33 feet wide, and 19 feet high.

No. 3 house, now devoted to the cultivation of ferns requiring a cooler temperature than those in No. 2, was built in 1892. It is 60 feet long, 23 feet wide, and 13 feet high. Previous to 1892 the site was occupied by a T-shaped house also used for temperate ferns. Like the larger fernery, this was formed originally by joining two houses, one of which had been built as long ago as 1803.

The leading idea to be borne in mind in the cultivation of ferns is that they should enjoy abundant moisture, both in the atmosphere

Cultivation. and at the root. The maintenance of a high state of

humidity in the house is essential even in winter. The necessity of copious watering at the root has suggested a system of cultivating many ferns, especially those with creeping rhizomes, on

flat rafts made of open woodwork. On these the soil can be packed round the roots into a sort of mound, which not only gives the rhizomes abundant space to spread, but enables ample supplies of water to be furnished without any danger of producing a sour, stagnant state in the soil, which is apt to occur when ordinary pots are used. This plan, in short, combines many of the advantages of planting out, with the convenience of pot-culture. In a wild state ferns are often found in shady places, but in most cases the reason of this is that they are seeking for shelter and moisture rather than shrinking from sunlight. Under cultivation in Great Britain it is found that they should be treated in regard to light and shade pretty much as other greenhouse plants are treated. A time when careful shading is very necessary is when the tender, delicate young fronds are unfolding. But it has been abundantly proved that the permanent exclusion of pure sunlight by the use of green glass was an unfortunate error.

The group of ferns known as "filmy," from the wonderful delicacy of their almost transparent fronds, are real shade-lovers. So sensitive to dryness are they that they require to be grown in glass cases, where the atmosphere can be kept as near saturation point as possible. Nor should the direct rays of the sun ever reach them. At Kew most of them are cultivated in a small house built against the north side of the tropical-fern house in 1892. It is 50 feet long and 14 feet wide, and each side of the central path is occupied by a glass case in which the ferns are cultivated.

CHAPTER V

SUCCULENT PLANTS (CACTUSES, ETC.)

PERHAPS the most characteristic of all the types of vegetation on the globe is that which belongs to its dry, hot areas. This vegetation is notable for the grotesque forms it assumes, its fleshiness and succulency, the absence of foliage in the ordinary sense of the word, the thick epidermis, and the excessive armature of spines and prickles. Such plants are capable of going without moisture for long periods, having the faculty of storing up large quantities of water and parting with it slowly. The two most important of these areas, so far as cultivated plants are concerned, are the dry belt of North America, including parts of Mexico, Texas, Arizona, etc., and the great dry region of South Africa. The first of these gives us the bulk of the cactuses and Agaves; the second is the home of the Aloes, Euphorbias, Mesembryanthemums, and Stapelias. Areas of great importance also, but furnishing a smaller number of cultivated plants, are the North African region, including parts of Arabia, Abyssinia, Socotra; the South American region, comprising parts of Chile, the Argentine Republic, etc.; and a great portion of Australia.

The Cactus House (No. 5) at Kew is intended to present an epitome of the flora of all these regions. The north end of the house is devoted to plants requiring great heat, the south to those from cooler countries. The building itself, which is 200 feet long, 30 feet wide, and 20 feet high, was first erected in 1855, but was pulled down and rebuilt in 1904, and at the same time made lighter and generally improved. It now contains the most extensive collection of xerophilous plants in Europe.

The cultivation of this class of plants has of late years become more widespread, especially on the Continent, where the intenser light and heat of the summer favours them more than do the cloudier skies of the North. Their chief requirement is, indeed, abundant sunlight.

Although they are capable of withstanding—and do, in nature, withstand—extreme and continued drought, it is not advisable in cultivation to attempt to imitate Nature's treatment too

Cultivation. closely. Except during the three dullest months, when water may be almost entirely withheld, these plants should be watered regularly. But it is most important that there should be perfect drainage at the root. Nor should the atmosphere of the house in which they grow be kept unusually dry. The old idea that these plants need extremely arid conditions is no longer held. Whilst admitting that they will tolerate them, it is now perceived that treatment approximating that of ordinary greenhouse plants is in the main suitable for them, especially in summer. Watering need not, of course, be so frequent, and artificial shading should be entirely dispensed with. For many years a few plants too tall for the Cactus House have thriven well in the moisture of the large Palm House.

Whilst the most noticeable features of the plants in this house are their fantastic forms and their forbidding array of spines, many of them produce flowers of singular beauty. This is **Cactuses.** especially true of the cactus family, such as the species of *Phyllocactus*, *Epiphyllum*, and *Cereus*. To this last genus also belong those remarkable species whose flowers open towards night-fall, blossom throughout the night, and fade the next morning. This genus, *Cereus*, is on the whole, perhaps, the most remarkable of the family of cactuses. The plants frequently take the form of one or a cluster of tall, erect, slender, and excessively spiny columns, each no thicker at the base than near the top, with fluted or angled sides and no leaves. Sometimes the stems are prostrate, sprawling snake-like over the ground; sometimes considerably thicker at the top than at the base, and of a shape suggesting a giant's bludgeon. One of the most famous is *Cereus senilis*, the Old Man cactus, the upper part, or head, of which is covered with a shock of grey, wiry hairs. The plants grow slowly, and some of those here, but a few feet high, are older than many large forest trees.

Nearly allied to *Cereus* are *Echinocactus* and *Melocactus*, the species of which, however, are shorter, thicker, or almost globular in form. They are even more formidably armed, some being furnished with hooked spines like fish-hooks, others merely curved, and some straight—all, however, rigid and hard as spikes of steel. It was a species of *Echinocactus* (*E. Visnaga*), nine feet high, three feet in

diameter, and weighing one ton, that was introduced about 1847, and for several years was the chief wonder of Kew. The *Opuntias*, or Indian figs, are also a remarkable genus of cactuses, many species consisting of flat, fleshy, oval or rounded segments, often like thick platters, joined together by a short woody connection. Many of them have handsome yellow flowers, some produce edible fruits, and some species harbour the cochineal insect, from which valuable crimson and other richly-coloured dyes are obtained.

The *Euphorbias*, or spurges, are freely represented in the warmer part of the house. They are exceedingly variable, but always extra-

ordinary in form. Some have erect, fluted, columnar stems like the *Cereuses*, others are square, and some are slender, thong-like, and drooping. Nearly all of them secrete a milky juice that is virulently poisonous. The aloes, well known for their exceeding bitterness, are here in great numbers, the flowers of many being very beautiful. In the warm section of the house may be seen, too, the strange grass-tree of Australia, with a thick, black, cylindrical trunk, from the apex of which is developed a crown of innumerable slender, arching, rush-like leaves; the *Stapelias*, South African plants, whose flowers have an odour so carrion-like that they are often fly-blown in summer; the curious, whip-like *Rhipsalis*, and many more.

The cooler end of the house is very largely occupied by *Agaves* or "American aloes," some of them fine, stately specimens, with

huge fleshy leaves, so thick and rigid that the plants might well have been cast in iron. To the *Agaves* belongs the fabled "century-plant" which was supposed to live one hundred years, flower, and then die. The plant does die (except for occasional offsets) after flowering, but it does not require one hundred years, or any fixed time, to arrive at the flowering stage. Valuable fibres, notably the sisal hemp, are obtained from species of *Agave*. Here also may be noted the silver tree of South Africa; the curious *Testudinaria*, or "elephant's foot," from the same region, with a slender climbing growth rising from a huge woody base two feet or so across; the kaki from Japan, a tree whose fruits, imported from the South of Europe, are now frequently on sale in the London shops; and, on the shelves, the interesting and often beautiful plants belonging to such South African, Mexican, and Canary Island genera as *Crassula*, *Cotyledon*, *Sedum*, and *Sempervivum*.



CACTUSES AND ALOES : A VIEW IN THE SUCCULENT HOUSE.

A few cactuses, belonging mostly to the genus *Opuntia*, may be grown out-of-doors. They are outlying species from the vast cactus region of the south-western United States, occupying Hardy positions at a higher altitude than the great bulk of the Cactuses. family, or coming from more northerly localities. At Kew they are cultivated in the recesses on the south side of the Palm House. These hardy cactuses present no special difficulty in cultivation if a suitable position can be found for them. They should be planted in soil with which plenty of rubble has been mixed, the chief thing being to secure ample drainage at the root. And they should, of course, have the fullest exposure to sunlight.

CHAPTER VI

THE TEMPERATE HOUSE

IN many respects the most interesting and most beautiful vegetation on the globe is found in climates warmer than that of Great Britain, but cooler than that of the tropics. It is the vegetation of South Europe and Asia Minor ; of the warmer parts of China and Japan ; of North and South Africa ; of Southern Australia, New Zealand, and Tasmania ; of the Southern United States and Mexico ; of the warmer parts of Chile ; and of the middle elevations of the Himalaya, the Andes, and all high mountains of the tropics. Within these areas grow many of the fruits and flowers most cherished by mankind ; the grape, the orange, the lemon and all its tribe, the fig, the pomegranate, olive, and myrtle. It is the vegetation of these regions which the Temperate House at Kew is intended to represent and to illustrate.

The building, designed, like the Palm House, by Mr. Decimus Burton, is strikingly different from that structure in its general outlines. In contrast to the soft curves of the tropical house, the lines of the Temperate House are rigidly formal. It consists of three sections—a large central block with north and south wings. Each wing is connected to the central part by an eight-sided structure fifty feet in diameter. The middle block (here alluded to as the Winter Garden) covers a rectangle 216 feet long by 140 feet wide. The apex of the roof is 60 feet from the ground. Both it and the octagons were built by Messrs. Cubitt. They were completed in 1862, at an approximate cost of £29,000. Although the terrace on which the whole building stands had been made (the material was taken from the site of the present Lake) and some of the foundations for the wings laid, further progress with the work was indefinitely postponed, and for more than thirty years nothing more was done. In 1894, however, owing largely to the influence and advocacy of Mr. Joseph Chamberlain, then Secretary of State for the Colonies,

the erection of the south wing was sanctioned. It was completed in 1897. Soon afterwards the north wing was commenced; and in 1899 the whole building stood completed, nearly forty years after the first "footings" had been laid. Each wing is 116 feet long, 64 feet wide, and 38 feet high. A porch 12 feet by 8 feet is built at the entrance to each wing. The total length of the building is 628 feet, and its greatest width 164 feet. The cost of the wings was about £14,000, bringing the total cost of the entire building up to £43,000. It covers about 1½ acre. Each of the three great divisions is kept at a different temperature. The coolest is the northern one, or Himalayan House, which is not much warmer than the air out-of-doors. The warmest is the south wing, or Mexican House, which is semi-tropical. The big central block is intermediate.

In a plant-house of the character of the Temperate House at Kew there are three essential factors on which, more than any other,

Green-tinted Glass. the health of the plants depends: these are adequate light, ventilation, and drainage of the soil. When the

Palm House was built, a suggestion—an unfortunate one, as it proved—was made by Mr. Robert Hunt, F.R.S., that the roof glass should be tinted green. The idea was that by intercepting the heat rays the scorching effect of the sun in bright weather might be tempered. Whilst doing this, however, it also reduced the quantity of light in winter and in dull weather, when every ray of light is precious. The suggestion was adopted and, in spite of the doubts of practical gardeners, the use of green glass in Kew continued for over forty years, not only in the Palm House, but in the Temperate House, Ferneries, and other houses as well. About 1887, however, the use of colourless glass was resumed, and the effect was soon apparent in the improved vigour of the plants. Experience has shown that in large airy houses like the Palm House and Temperate House, the fiercest sunshine ever obtained in Britain is powerless to injure the ordinary plants growing therein, even when the glass is pure.

The second thing which, we have said, is essential to a plant-house of this description is ventilation. It has always to be remembered

Ventilation. that many of the plants growing in the central and north divisions would thrive perfectly well—or even better—out-of-doors for at least four months of the year. The free admission of fresh air during warm weather is indispensable to success.

The question of drainage, too, is very important. In houses of this kind, where all, or nearly all, the plants are planted out, a frequent mistake is that of making the beds of soil too deep. For strong, coarse-habited plants like some palms this does not matter, but it is fatal to the permanent well-being of many delicate-rooted plants such as are grown in this house. In plant-houses, soil not permeated with roots is apt to become heavy and sour in a degree that never occurs in the open air. The only way to obviate this is to keep the soil as shallow as is consistent with the requirements of the plants, and to secure perfect drainage. When the two wings were being prepared for the reception of the plants, the bottom of each bed was laid with ordinary drain-pipes arranged to carry the surplus water right out of the house. Above these was laid a two-foot layer of brick rubble, leaving from 2 to 2½ feet to be filled with soil. This is ample for all but the largest trees, such as the Araucarias, etc., in the centre beds of the Winter Garden. For many plants eighteen inches are sufficient. When the Winter Garden was overhauled a few years ago, the beds, wherever possible, were treated similarly. The present remarkable health and vigour of the plants in this division is largely due to this policy and to the provision of more light when the building was re-roofed. These two things combined have also enabled many delicate plants to be cultivated here with success for the first time.

We now proceed to give some notice of the more remarkable features and more notable plants in the different sections of this house. The digression into the general principles that should govern the construction of conservatories of this class is, however, justifiable; for it is becoming a very popular class of plant-house, but even in these days is not always built in accordance with the most scientific principles. This is especially the case with winter gardens and conservatories built by public authorities in city parks and gardens. Here the matter is usually put into the hands of an architect quite ignorant of the requirements of plant-life, whose sole object is to produce an agreeable or imposing effect from outside. No doubt the architect's aim is a worthy and even an important one, but the lavish use of stone and other opaque building materials in a plant-house is opposed to the well-being of the plants it contains. Such materials should be reduced to the smallest limits consistent with the stability and dignity

Architects
and Plant-
houses.

of the building. The most important development in modern greenhouse construction is the recognition of the necessity of light and fresh air. The disregard of these essential matters is almost entirely responsible for the uninteresting character of the vegetation in most public plant-houses of large size. The plants are usually dull and flowerless, because scarcity or profusion of blossom is almost wholly a question of light.

By far the most important of the three divisions is the great central one called the Winter Garden. No house of plants in Kew is, on the whole, so charming and uniformly agreeable as this. In cold, wintry weather the thermometer is often but little over 40° Fahr. in this house; but the change from the bleak outside, with its leafless trees and perhaps biting wind, to the soft, still air and richly luxuriant vegetation of the Winter Garden is always delightful. In the torrid heat of July and August, on the other hand, when one is apt to look askance at any glass-house, it is frequently cooler here than out-of-doors. It is a type of greenhouse which probably gives greater pleasure with less cost than any other. No fire-heat is needed for about half the year, and but little during the remainder, and as all the plants may be grown in beds, the work of watering and otherwise tending them is reduced to a minimum. In this house great numbers of plants are grown on the side shelves in pots, but this is simply due to the necessity of maintaining a collection of numerous species. In a private garden, or in one where botanical aspects have not to be considered, benches for pot plants may be dispensed with, and the whole house utilised for plants grown in plots of earth. This is, in fact, done in the two wings of this house.

In the Winter Garden the Australasian flora predominates. Nearly all the finest trees in it are natives of Australia itself, but some others come from New Zealand, Norfolk Island, and Tasmania. The flora of Australasia, like its fauna, is one of the most interesting on the globe, because it includes so many distinct races which do not exist elsewhere. In this house the trees that will strike the visitor most are two specimens of the bunya-bunya pine (*Araucaria Bidwillii*). They long ago reached the top of the house, and several times have had to be reduced in height. The branches are loaded with dense, heavy masses of spiny foliage, and the trunks are formidably armed. The fruits or

cones produced by this araucaria are each as large as a child's head. One of these trees commenced to bear them a few years ago. The seeds, both raw and roasted, are eaten by the aborigines of Australia. A curious fact about this tree is related by Bennett in his "Australasia." He says that each tribe possesses its own group of trees, which are distributed among the various families and pass as hereditary property from generation to generation. Allied trees, also noticeable for their great size and distinct appearance, are the Norfolk Island pine (*Araucaria excelsa*), *A. Cunninghami* from Queensland, and *A. Cooki* from New Caledonia.

The most characteristic of Australian trees are the eucalypti or gum-trees. Some of them more than rival the mammoth trees of California in height, if not in bulk. Fallen trees have been measured and found to be over 400 feet long, and some authorities describe specimens 480 feet high. A forest of gum-trees has a curious aspect to northern eyes. The foliage of most of them is of a peculiar grey, lustreless hue, and as the edges of the leaves (not their broad surfaces) are turned towards the sun, the forests have a curiously light and shadowless appearance. It is unfortunate that these trees can only be represented in a young state in this house.

Australia has very many beautiful flowering plants, but chief amongst them are the acacias. They are represented here by a great variety of species. The flowers are of varying shades of yellow, and are produced in tiny balls or cylindrical clusters. In foliage and mode of growth there is a great diversity. Many of the acacias thrive to perfection on the Riviera; at Cannes, in particular, they are abundant. The flowering branches of one of them, *Acacia dealbata*, are exported to England to the value of 4,000,000 francs annually. The species is well known in the London flower shops as "mimosa." The acacia season in the Winter Garden is from February to April.

The tree-ferns constitute an attractive and striking feature. They are really a tropical and semi-tropical type of vegetation, inhabiting shady, moist glens and forests, and having the general aspect of a palm; but they are infinitely more graceful. Alfred R. Wallace says there is nothing in tropical vegetation so perfectly beautiful. In the islands of Australasia several species occur which grow to perfection under conditions as cool as those



A VIEW IN THE WINTER GARDEN.

of this house. In the mildest parts of the British Isles one species (*Dicksonia antarctica*) can be grown in the open air. The two groups of these plants at the north end of the Winter Garden, each plant with its exquisite crown of fronds surmounting a black, fibrous stem, should not be missed. Two fine *Dicksonias* grow near the east door, and others line the longer central path, or are scattered over various parts of the house.

The palms growing here represent more widely scattered regions than the tree-ferns. They come from China, Japan, Australia, New Zealand, the Himalaya, North Africa, California, and Chile.

Palms. The most remarkable palm in the house is a specimen of the Coquito palm (*Jubæa spectabilis*). It was raised from seed purchased for Kew in 1843. It has now a huge bottle-shaped trunk $7\frac{1}{2}$ feet in girth. There are also fine specimens of the date palm and Chusan palm. From a habitat nearer home than that of any other palm we have *Chamærops humilis*, found along the shores of the Mediterranean from the south of Spain eastwards. These palms, most of which have tall slender trunks crowned with a cluster of leaves, constitute a most important feature in the house. Their tropical aspect and varied form help largely to produce that diversity of vegetative types to which it owes so much of its interest.

The best idea of the subtropical vegetation in this house is to be got from the gallery, which runs round the entire building. The most prominent types at this elevation are the palms, tree-ferns, and araucarias, to which allusion has already been made. But there are, besides, many other diverse types, conspicuous amongst which are the Cordylines from New Zealand and the Yuccas from the New World. Both these are liliaceous plants with tall slender stems, sometimes from 30 to 40 feet high, surmounted by a crown of leaves, arching and graceful in the Cordylines, rigid and spine-tipped in the Yuccas. In one spot a full view is obtained of the spreading feathery masses of bamboo; in another the blue-grey mass of *Acacia dealbata* is seen. The interesting New Zealand conifers, *Podocarpus Totara* and kauri pine (*Agathis australis*), can best be examined from the gallery, as can also, in the north-east corner, a fine plant of *Talauma Hodgsoni*—a near ally of the magnolias—from the Himalaya. Near the north staircase is a climber (*Asparagus falcatus*) of extraordinary vigour, whose light grey, spiny stems and dark leafage are in effective contrast.

The south staircase is covered by the wonderfully luxuriant *Semele androgyna*, a climber from the Canary Islands, whose flowers are borne on the edges of the leaf-like branches. Suggesting one of the lianas, or vegetable cables of the tropical forest, is a species of *Mucuna* from China, a climber stretching in one loop from the gallery to the roof.

It has not been possible to do more than allude briefly to a few of the leading groups of plants grown here. But the beds are filled with plants, brought from all the warm temperate areas of the globe, notable for their beauty of leaf or flower or for their economic or scientific interest. Amongst them are the camphor tree; many proteaceous plants such as *Banksia*, *Hakea*, *Grevillea*, and *Stenocarpus*; the Australian bottle-brushes, such as *Callistemon* and *Metrosideros*; the pencil cedar, *Juniperus bermudiana*, whose wood is used in the manufacture of lead pencils; the noble *Musa Ensete* from Abyssinia, etc.

In the south wing, or Mexican House, none of the plants is grown in pots. The central area is divided into four rectangular beds, and a border seven feet wide runs round the sides and ends. The need of a house of this character had long been felt at Kew. The large tropical plants were already provided for in the Palm House, as were also the plants from Australasia and similar climates in the Winter Garden. What was required was a house in which could be grown plants requiring a temperature intermediate between those of the two older structures. It was decided to devote this house to such plants, especially those of economic interest. The term "Mexican" by which it is known is, however, more indicative of the temperature at which it is kept than of its contents, which are far from being exclusively Mexican.

The most striking pictorial features of the house are two groups of succulent or xerophilous plants growing on a kind of rockwork at the south end. Among them are some fine specimens of *Cereus* and *Agave*, most conspicuous of which is a plant of *Cereus giganteus*, 9 feet high and 1 foot or so in diameter—a solid, fleshy mass, and the largest single-stemmed cactus in Kew. There are also some fine examples of the remarkable cactus-like *Euphorbias* from South Africa. Of the economic plants, the most notable are mango, which has borne fruit in this house; lemon, a large-fruited variety which bears freely and forms one of the most

remarkable features; and shaddock, guava, and quinine plants. Among purely ornamental plants the *Strelitzias* are very striking, especially *S. Reginæ*, with orange and blue flowers, and the tall *S. augusta* and *S. Nicolai*, with great splendid leaves. In one of the side borders is grown a collection of Javanese rhododendrons, a distinct and semi-tropical branch of this beautiful genus. The purple-flowered *Brunfelsias*, planted in the borders, succeed better here than they have ever done elsewhere in Kew, as do also specimens of *Lagerstroemia* or Indian lilac. Palms and cycads are planted freely; of the former, *Cocos flexuosa* produces a stately effect planted as an avenue along the central path.

The "peepul" (*Ficus religiosa*), perhaps the most sacred of all trees in India and Ceylon, is here. A plant of exceptional interest is *Dracæna Draco*; it is a portion of the famous Dragon Tree of Orotava, Teneriffe, a tree which was, perhaps, the oldest in the world when it was destroyed by a gale about 1867. It had not gained appreciably in size during the last 450 years of its life. The "tree tomato" (*Cyphomandra betacea*) bears large crops annually, as does also the papaw, the remarkable plant which produces an edible fruit and whose leaves have the strange quality of rendering tough meat quite tender when it has been wrapped in them for a few hours.

The Himalayan House is of the same dimensions as the Mexican House, and the internal arrangement of the beds is the same. Whilst the Mexican House provides warmer conditions than the great Winter Garden, this wing is devoted to plants requiring cooler conditions. All the plants in this house, indeed, would thrive perfectly well in the open air at Kew for eight or nine months of the year, but would often find the winter too severe and the spring too uncertain. Most of them succeed admirably in Cornwall and the south-west of Ireland. The prevailing type of vegetation here is North Asiatic, especially Himalayan, Chinese, and Japanese. But a few New Zealand and South American plants find a place also.

Ever since the systematic introduction of foreign plants to Great Britain was commenced by Kew in 1772, certain well-marked epochs have occurred in which the plants of a particular area of the globe have been largely introduced for the first time. Thus the latter years of the eighteenth century are associated in the minds of horticultural

students with South African plants; the first decades of the nineteenth century with Australian plants; the 'fifties with West American conifers; the later decades of the century with tropical orchids. We live in an epoch now which will, in time to come, be associated with the flora of Western China. In the same way the years 1847-51 constitute a minor epoch, and are important in the annals of horticulture as witnessing the first great introduction to England of the magnificent rhododendrons of the Himalaya. These were the years in which Sir Joseph Hooker made his famous Himalayan journeys, and it is to him that our gardens owe their first possession of these gorgeous plants. He sent seeds home to Kew, and the plants raised from them were distributed to other gardens, public and private. They are now the glory of many a Cornish garden, but unfortunately a small number only can be grown with success in the open air at Kew. The little shelter they need (it is in spring more than in winter that they need it) is provided by the Himalayan House. Here a few degrees of frost are not considered harmful, and fire-heat is only used when the weather is exceptionally severe.

Rhododendrons—species, varieties, and hybrids—constitute the predominant feature of this house. All of them flower during the first five months of the year, and make it very gay and interesting then. Their colours range from a rich blood-red, through all the grades of rose and pink, to white. Camellias, both species and garden varieties, are well represented, and among them is *Camellia theifera*, the Chinese shrub whose dried leaves form the tea of everyday use. A singularly graceful coniferous tree is *Cupressus funebris glauca*, with pendulous, blue-white branches. Other interesting species of the same group are *Pinus longifolia* (a Himalayan pine) and *Microcachrys tetragona* (from New Zealand). At the south end is a large group of a singular and beautiful vacciniaceous plant from the Himalaya, *Pentapterygium serpens*; this plant is epiphytic—i.e. it grows on the branches of other trees—and sends out from a tuberous woody base long serpentine shoots which bear rows of pendent scarlet flowers.

Two rock-pools near the northern entrance impart an agreeable diversity to the aspect of the house, and afford suitable conditions for moisture-loving plants too tender to show their best out-of-doors. Most notable of them is, perhaps, a species of *Lysichitum*,

an aroid that comes from Kamtchatka, which bears large canary-yellow flowers.

A collection of climbers clothes the lower part of the roof. Here grow and flower most luxuriantly the New Zealand clematis (*C. indivisa*) and the South European honeysuckle (*Lonicera* Climbers. *Etrusca*), a pair of the most beautiful climbing plants ever introduced to Great Britain. There are, besides, species of *Vitis* and *Rubus*, roses, *Berberidopsis corallina* from Chile, and the red and white *Lapagerias*.

The octagons are not well adapted for plant-growing ; their value is chiefly architectural, and they serve at once to separate and to connect the three large structures. In the north octagon there is grown a collection of formally clipped shrubs, such as bay, olive, *Pittosporum*, myrtle, and *Euonymus*. The south octagon is given up exclusively to the orange tree and its allies.

CHAPTER VII

THE CONSERVATORY (NO. 4)

THE one plant-house at Kew in which horticultural interests predominate over purely botanical ones is the Conservatory, known also to Kew people as "The Greenhouse" and "No. 4." Here no attempt has to be made to keep up a collection. Each plant is grown entirely on its merits as a decorative object. The general aim held in view is to provide, all the year round, as gay and varied a display of flowers as possible. It is the most popular house in Kew. On Sundays in March and April, which are the months when the house is most brilliant in its display, its paths are often uncomfortably thronged, and there is frequently a crowd at the entrances not unlike that at the pit door of a theatre. The house is of cruciform shape, 156 feet long and $22\frac{1}{2}$ feet wide; the transept is 70 feet long by 35 feet wide. The side shelves, which are filled with plants in pots, have a total length of about 360 feet. The central area is occupied by plants of larger size, in pots standing on the floor. The only portion of the house where plants are growing in beds of soil is in the wings. Here are two square plots of earth, one filled mainly with camellias, the other with a selection of choice flowering shrubs, chiefly Australian.

Only those conversant with such work can estimate the thought, labour, and expense involved in keeping a house of this size bright with flowers throughout the year. It is thoroughly overhauled once a week, and the plants whose flowers are getting past their best, and are no longer worthy of their place here, are removed. If they are worth it, they are taken back to the private house whence they came, to be grown on again for another year.

The chief difficulty with a house maintained as is this, is to keep up a perfect succession of plants in flower. A plethora at one season has to be guarded against as much as a shortage at another. Con-

siderable foresight and judgment are needed, therefore, to bring the batches of plants into blossom just when they are needed. The majority of the kinds relied on to supply this house are old and well-tried favourites, such as fuchsias, chrysanthemums, primulas, cyclamens, hippeastrums, azaleas, and so on. But distributed among them will nearly always be found others of greater rarity. Kew, from its connection with the newer British colonies, is often the first to discover the merits of lately-introduced plants, and many, whose merits perhaps had already been ascertained in the more botanical houses, have first shown their full beauty and value to the public in this house. Among recent accessions of this kind may be mentioned *Coleus thyrsoides*, *Impatiens Oliveri*, and *Moschosma riparium*. Other beautiful greenhouse plants, not foreign, but raised at Kew, which have found their way into almost every greenhouse, are *Primula kewensis* and the hybrid Streptocarpuses. It will not be possible to do more than give a short *résumé* of the plants chiefly relied on to furnish this house throughout the year.

Almost as soon as the new year has begun, and from then until April, a prominent feature is the succession of hardy shrubs forced into flower. Here one may anticipate by two or three months the natural flowering out-of-doors of some of the most beautiful of hardy cherries, crabs, plums, spiræas, Forsythias, etc.; also that of many bulbous plants like tulips, daffodils, and hyacinths. Among other important plants in the first quarter of the year are the Chinese and Japanese primroses, the cyclamens, the acacias, epacrises, and many other Australian plants. In recent times no genus of plants has improved more under the gardener's hand, or made greater advances in public favour, than the hippeastrums. They make a brilliant display in this house during the early months of the year, and are at their best in March and April.

In the second quarter—from April to June—most of the forced plants have disappeared. Their time has come in the open air. Still, a few remain; the flowers of the Moutan peonies, for instance, which do not succeed well out-of-doors at Kew, are magnificently developed in the soft atmosphere of this house. But in the main their place is taken by other naturally tender things. We have many beautiful varieties of Indian azalea, the ever popular pelargoniums, the greenhouse calceolarias, the

South African arctotis, the beautiful Chilian schizanthus. Then there are the now favourite, brilliantly coloured cannas, and the blue and white *Senecio Heritieri*.

During the sultry days of July, August, and perhaps September, the attractions of the open air are more insistent than those of any greenhouse. Yet this Conservatory, with its shade and
July to copious ventilation, is one of the pleasantest glass-
September. houses in Kew, and it is still regularly filled with flowers. Now is the time of the Malmaison carnations, fuchsias, the blue and white *Campanula pyramidalis* and other bell-flowers, and several sorts of begonia. Less commonly known, but strikingly attractive, are *Jacobinia magnifica* and the scarlet-flowered *Clerodendron fallax*. At this period, too, the climbers on the roof add much to the beauty of the house. Chief among them are the fuchsias, the Etruscan honey-suckle, the blue *Lantana salvifolia*, abutilons, and the curious rhodochiton. Growing in baskets suspended over the paths are the old-fashioned achimenes, glowing masses of mauve and purple, and the remarkable "glory pea" of Australia—*Clanthus Dampieri*.

For quite half of the last quarter of the year the most important place in this house, as in nearly all others of a similar character, is filled by the chrysanthemum. But supplementing it
End of the we have the scarlet *Salvia splendens*, the blue *Salvia*
Year. *azurea*, several species of South African heaths, and begonia "Gloire de Lorraine." All these plants do not constitute a tithe of those used in this house, but they are some of the more important ones. The system of arrangement adopted here is to set out the plants as much as possible in groups. Thus, from half-a-dozen to a score will form a group, sometimes by themselves, but usually in association with others whose colour of flower or grace of foliage is calculated to emphasise and enhance their beauty. The general idea kept in view is to provide a succession of varied and beautiful effects rather than a continuous medley all round the stages.

The coolest compartment of the T-Range (No. 7) is given up to a class of plants similar in character to some of those which in
Cape House. their season help to furnish the Conservatory. Here are cultivated the heaths from the Cape of Good Hope, and the mesembryanthemums and pelargoniums from the same region. The first and last have, in their time, held an important place in gardens, but the heaths have fallen on evil times. They

are now scarcely known in gardens except for a few easily-grown species. Even at Kew they make a poor display compared with the plants of one hundred years ago. There is a very good collection of mesembryanthemums here—curious succulent plants whose leaves occasionally take on extraordinary forms. Some have leaves so similar to pebbles and small stones that it is not always easy to distinguish them.

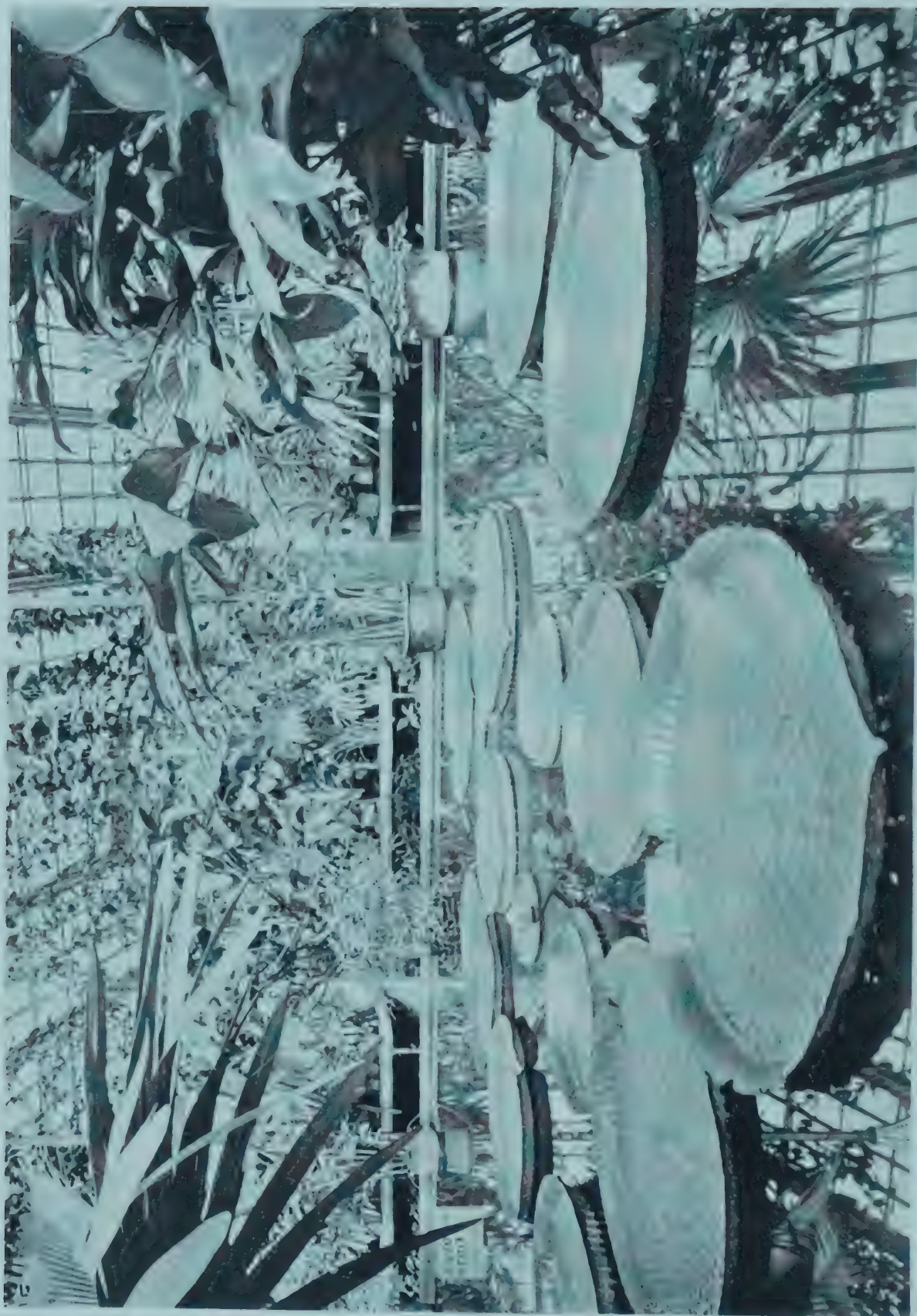
Of pelargoniums the best known is the species with brilliant scarlet flowers commonly called geranium, which is so popular a plant for summer bedding. English gardens owe its introduction, like that of many heaths and other Cape plants, to Francis Masson, who went out from Kew in 1772 to collect plants in South Africa. About fifty species of these Cape pelargoniums are grown here. There is also a medley of other curious plants from the same region, notable amongst them the curious hæmanthus, or “blood-flowers.”

CHAPTER VIII

AQUATICS

Two glass-houses in Kew are devoted to the cultivation of tropical aquatic plants. One is No. 10, in the T-Range, the other is No. 15, near the Palm House. The famous *Victoria regia* occupies Victoria one house, but owing to the disease by which it has, in Regia. late years, been attacked, it has been found advisable to change its quarters occasionally. The house not occupied by it is devoted mainly to a collection of Nymphæas. First among aquatic plants in importance and interest, for it is one of the vegetable wonders of the world, is the *Victoria regia*. The middle of the nineteenth century was a stirring time in horticulture. A greater number of prodigies in plant-life were discovered or introduced to notice about that time than, perhaps, at any other period. We may instance three: the *Victoria regia*, the mammoth trees of Calaveras, and *Welwitschia mirabilis*. Of them all, the *Victoria regia* created the greatest sensation in England, for it has the unusual quality of attaining in British hothouses, and in a single year, its full development and beauty. This beauty, moreover, is scarcely, if at all, inferior to that of the wild plants whose huge circular leaves float on the backwaters of the Amazon and other South American rivers. It opened its first flower at Kew in 1850, and ever since has been one of the most popular sights there.

The original discovery of the *Victoria regia* by Europeans was made as far back as 1801. In that year a botanist named Haenke had been sent by the Spanish Government to Peru, to Its investigate its vegetable products. In company with Discovery. a missionary named La Cueva, he was travelling in a pirogue on the river Mamoré, one of the tributaries of the Amazon, when he came upon this noble aquatic in one of its backwaters. It was subsequently noticed by several European travellers, among others by Bonpland (at one time coadjutor of the great Humboldt)



THE GIANT WATER LILY, VICTORIA REGIA.

in 1820, and by D'Orbigny in 1827. The first man to excite a general interest in it, however, was Sir R. Schomburgk, the traveller and botanist whose proposed boundary between British Guiana and Venezuela became in after times so famous as "Schomburgk's line." He discovered the great water-lily on the Berbice River, in British Guiana, in 1837. It is now known to be so abundant as to fill pretty much the same place in the waters of tropical America as the white water-lily (*Nymphæa alba*) does in English waters. By the inhabitants it is known as water maize ("Mayz de l'eau"), a good flour being obtained from its seeds.

In 1837, Dr. Lindley obtained permission from Queen Victoria (then newly ascended to the throne) to name this, the queen of
 Its aquatics, in her honour. It was henceforth called
 Introduction. *Victoria regia*. Nine years later, in 1846, a Mr. Bridge brought seeds of it home to England. They were purchased by Kew, but although they were sown and duly germinated, the season was too far advanced for them to get established before winter. The young plants died in the following December. Another attempt to introduce the plant to Britain was made in 1848. Seeds, and with them roots, were again sent to Kew from South America, but they arrived quite dead. In the following February, however, a third and successful attempt was made. Seeds were sent to Kew from Demerara, in bottles of water, by Dr. Hugh Rodie and Mr. Lachie. They grew quickly, and ultimately young plants were distributed to several notable gardens in Great Britain. Chatsworth had the honour of being the place where its flowers first opened in England. This happened on November 9th, 1849. It flowered at Kew in the following year. The delay was due to the want of a suitable tank for its accommodation.

Victoria regia is now grown at Kew as an annual—that is to say, its seeds are sown every spring. It grows and flowers during the summer and autumn, and, as winter approaches, the leaves having become smaller and smaller, it dies or is cleared away. It is no longer possible—even were it necessary, now London has come so near to Kew—to keep it alive through the winter, as was done in the first years of its cultivation, when Kew was still a semi-rural spot.

Sir Robert Schomburgk, who measured its leaves on the Berbice River in 1837, gave their dimensions as follows :—Leaf, 6 feet 5 inches in diameter, the upturned rim 5 inches deep ; flowers, 15 inches across.

Except in regard to the flowers, these dimensions have been exceeded by cultivated plants. Leaves have been produced under

Wonderful glass 7 feet across, with rims 6 inches deep. The
Leaves. under surface of the leaf is more remarkable than the upper one. It is purplish red, and is covered with a

network of spiny ribs and veins, several inches deep, and with the apparent strength of so many iron girders. The hollow spaces between the ribs are ordinarily filled with air, which imparts great buoyancy to the leaf. With the pressure properly distributed, a leaf will quite easily support a child of twelve or fifteen years. During the summer, a leaf of the plant at Kew is usually inverted, so that visitors may see its marvellous construction.

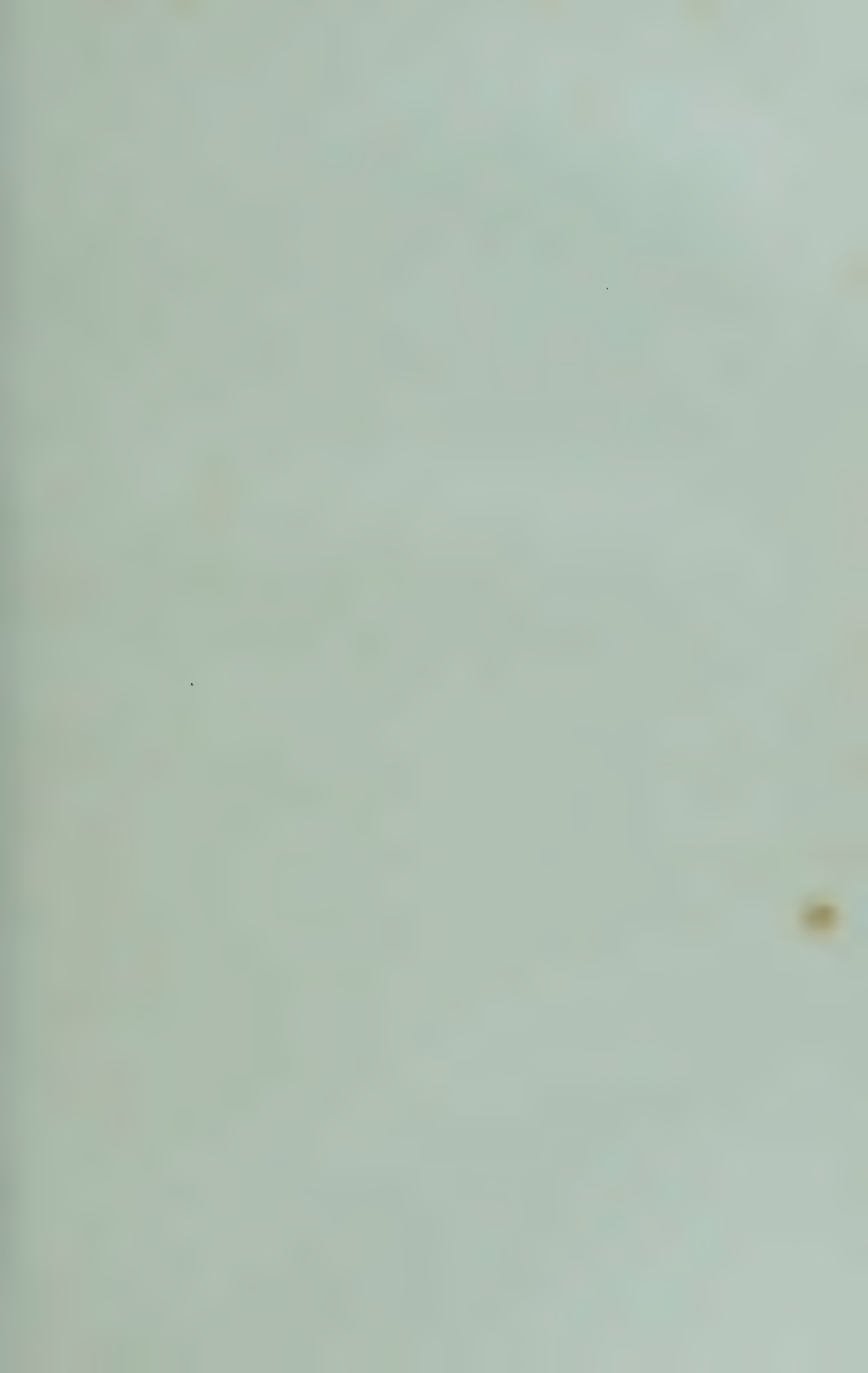
As one might infer from its enormous dimensions and extraordinarily quick growth, the *Victoria regia* is a gross feeder. Every

Cultivation. fresh plant has to be supplied with several cartloads of good loam, enriched by rotted manure. The water is kept at first at a temperature of about 80° F., reduced to 75° as the plant becomes strong and established. Perhaps the most important desideratum is abundant and unrestricted light. With these needs supplied, the cultivation of this noblest of aquatics presents no difficulty, except that in late years a troublesome fungus has often disfigured the leaves.

Although the *Victoria regia* fills the largest place in the public mind of all the aquatic plants at Kew, this group includes several

Nelumbium beautiful plants belonging to other genera, most notable
and of which are the Nelumbiums and the Nymphæas. The
Nymphæa. former is the "sacred bean" of the Hindus, and one of the plants known as the lotus of the Egyptians.

It was introduced to Kew by Sir Joseph Banks in 1787, and since that date has been uninterruptedly grown there. Ever since the present No. 15 House was built, the Nelumbiums have been cultivated in the small beds at the corners. These beds, nearly filled with rich soil and connected with the central tank by two pipes, are kept in a permanently boggy state. They thus afford an excellent position for the Nelumbium. Dying back to the submerged stems every winter, the Nelumbium sends up during the summer its wonderful leaves, the stalks of which are 6 to 8 feet high, bearing a large circular, plate-like blade. The flowers are borne on a stalk still higher than the leaves; they are aromatically fragrant,





TROPICAL WATER LILIES

and have numerous petals of the tenderest rosy pink. A North American species, *N. luteum*, has yellow flowers.

The Nymphæas, or water-lilies, are a more numerous class, and in ordinary gardens they constitute, because of their convenient size, the most important group of tender aquatic plants. *Nymphæa Lotus* is one of the plants represented on the ancient Egyptian sculptures. Both the species and several of its varieties are grown in the tanks at Kew; some have red, some white flowers. *N. gigantea* is an Australian species, and the finest of all water-lilies, its blue flowers being one foot across. Another species, with beautifully blue flowers, is *N. stellata*; its numerous varieties are found in the tropical waters of the Old World. A yellow-flowered species (*Nymphæa flava*) is a native of North America.

An aquatic plant of supreme interest and beauty is the papyrus (*Cyperus Papyrus*), which is so abundant on the banks of the Upper Nile. There is no plant in Kew more striking or more beautiful than the fine papyrus growing in No. 15 House which is seen in our illustration. Its tall slender stems are crowned with a ring of slender, drooping leaves. The stems of this plant furnished the papyrus of the ancients. Some papyrus documents taken from Egyptian tombs are in No. II. Museum.

Other interesting aquatic plants to be seen at Kew are the lattice-leaf plant of Madagascar (*Ouvirandra fenestralis*), whose submerged leaves are simply a network of vascular tissue like the skeletonised leaves of common trees; *Euryale ferox*, an ally of the *Victoria regia*, but smaller, and a native of India; *Eichornea crassipes*, the floating plant whose buoyancy is due to the inflation of the lower part of the leaf-stalks; and various other floating plants like *Salvinia* and *Azolla*.

Besides the aquatic plants, No. 15 House contains a varied collection of tropical plants. The climbers are the most noteworthy, especially those of the gourd family, whose fruits not only assume very fantastic forms, but are frequently brilliantly coloured. Seen at its best, which is from June to September, this house gives a singularly charming and un-hackneyed presentation of hothouse gardening.

In the other aquatic house, No. 10, the side shelves are occupied chiefly by large bromeliads. On the roof there is frequently to be

seen the wonderful *Aristolochia gigas*, a climbing plant from Guatemala, whose flowers, measured at Kew, have been 18 inches wide and 22 inches long, with a tail 42 inches long—a total length of 5 feet 4 inches. Over the tank in this house, sometimes with the pots partially immersed in the water, there has for years been grown a changing but always remarkable series of plants. It has been found that some of the most difficult and intractable of tropical plants succeed in this position. Here, in 1889, flowered for the first time in Europe that vegetable wonder, the giant aroid (*Amorphophallus Titanum*), and here, at the present time, is the largest orchid ever seen in Britain (*Grammatophyllum speciosum*), which was in flower for several months in the autumn of 1907.

CHAPTER IX

ECONOMIC AND MEDICINAL PLANTS, ETC.

EVERY year Great Britain, in common with other highly civilised countries of Europe, becomes more and more dependent on the products of tropical countries. For many fruits, spices, and condiments—even for certain foods and drinks and articles in everyday use—it has to rely entirely on an oversea supply. At first luxuries of the well-to-do, such things gradually become necessities of the poorest. Ever since its institution as a national garden, Kew has been busily engaged in the propagation of plants useful as food, in medicine, in manufactures, and in the arts; and in their distribution to those British Colonies and Possessions in which they are most likely to succeed. This works for the good of the Empire in two ways: in the first place, it opens up new industries in the Colonies, giving employment to capital and creating a demand for labour; and, secondly, by increasing the supply of the various products, it brings them within the means of a much larger proportion of the home population than could otherwise obtain them.

A work of great importance has been the introduction of useful plants from the tropics of the New World to those of the Old. The transmission of living plants, and even of many seeds, from (say) Brazil to Ceylon, is not so easy as may appear. It is not merely a matter of gathering the seeds, packing them, and consigning them to their destination. In the first place, it is all-important that the right thing should be obtained, and expert knowledge may be necessary to secure this. Then the seeds of many tropical economic plants lose their vitality quickly, and the journey is too protracted to be safe, even in these days of rapid transit. Great Britain, from its central position, on which all the great trade routes converge, affords a convenient halfway house. The usual process has been for seeds or plants to be sent to Kew. Here they are overhauled and, if in

fit condition, forwarded to their destination. If it be found that they are unfit for immediate despatch, the seeds are sown and the plants nursed in the small private plant-houses. When they have recovered from the effects of the first half of their journey, they are sent off in Wardian plant-cases to complete it.

One of the most successful and most profitable achievements in this connection was the introduction of the quinine plant (*Cinchona*) from Peru to the hill countries of India. In this work **Quinine.** Sir Clements R. Markham, late President of the Royal Geographical Society, took a prominent part. He organised parties to search the forests of the Andes for plants and seeds. These were despatched to Kew, whence a portion of them was transmitted to India, and the remainder grown in the hothouses and forwarded as occasion served, not only to India, but to Ceylon and other Colonies. In 1860, the year in which this experiment was undertaken, it was stated that the Indian Government spent over £40,000 in the purchase of quinine for Bengal alone. For several years it has been possible for anyone to purchase for a pice (about a farthing) a dose of five grains in any post-office in Bengal. When it is remembered that this drug is the only specific for malarial fever, the commonest and most fatal of tropical diseases, it will be realised how great a boon the cheapening of it has been to dwellers in the tropics. Quinine is largely used in England; its present price is about one-sixteenth of what it was in 1860.

In recent times scarcely any article of tropical origin has been put to so many uses, and become so indispensable to civilisation, as india-rubber. Numerous rubber-yielding plants exist; **Para** they occur on all large tropical areas. But the best and **Rubber.** most valuable is the Para rubber, the produce of a tree (*Hevea brasiliensis*) found wild in the Amazonian forests of Brazil. The natural supplies of this rubber, though still immense, are very inaccessible; this circumstance, having regard to the rapidly increasing demand for it, made it important to create fresh sources.

In 1875, a consignment of 70,000 seeds was received at Kew from Brazil. They were immediately sown, and although only a small proportion germinated (the seeds of this tree do not long retain vitality), it was possible to despatch more than 1,000 plants to Ceylon in the same year. From these plants the remainder of the Eastern possessions of Britain were subsequently supplied. In Singapore and

other parts of the Malay Peninsula, the Para rubber tree has prospered especially, having yielded not only fine rubber but abundant seeds. These have been utilised to make fresh plantations. Now the Para rubber industry promises to be one of the most extensive and most profitable in the East, and numerous limited liability companies have been floated to develop it. The whole had its origin in the plants sent out from Kew in the autumn of 1875.

These are, perhaps, the two most conspicuous instances of Kew's activity in this direction, but numerous others might be mentioned. The Ceara rubber and the Central American rubber, which come next in importance to that of Para, have also been introduced to the East.

The importation of bananas to Great Britain has attained enormous dimensions of late, yet the fruits received are of very inferior quality. By the distribution of superior varieties, Kew has been endeavouring to improve the future supply.

The promising tea industry of Natal had its beginning in plants obtained from Kew. Although the great bulk of cocoa (*Theobroma Cacao*) still comes from South America, the transmission to Ceylon of plants from Trinidad in 1880 laid the foundation of a new source of supply from the East. Numerous fibre-yielding plants have been sent to places suitable for their cultivation, and the same may be said of the finer varieties of pine-apple. The latest and most important work in the distribution of economic plants has been to supply the new botanic gardens of equatorial Africa with such as are likely to thrive there, and thus to originate new and profitable industries. Whilst the introduction of strictly useful plants to new Colonies has naturally been regarded as most important, the desire of the colonists to improve their surroundings has led to the introduction also of numerous purely ornamental garden plants.

The collection of tropical and subtropical economic plants at Kew cannot be described as entirely satisfactory from the spectator's standpoint. Many of them are, naturally, large trees which do not flower or produce fruit until they attain to the adult stage. To show many of them in their typical condition, therefore, is impossible. It is a curious fact, too, that several of them are more than ordinarily difficult to cultivate. The maintenance of as good a collection of these plants as possible has, however, two great advantages. It provides material from which

new stocks can be propagated and sent abroad as required, without having to revert to the native source; and by keeping authentic specimens under view, it enables the identity of newly imported plants, or plants *en route*, to be established. This is the more important because so many economic plants possess no very striking or distinguishable characters of leaf and habit. Visitors to Kew are frequently disappointed that many famous plants should have so ordinary an aspect. There is the upas tree, for instance. Although it does not possess the devastating powers poets and ancient travellers ascribe to it, it yields a poison deadly enough indeed. But its aspect is as guileless as that of the common privet.

The collection proper of tropical and subtropical economic plants is grown in the two compartments of the T-Range which constitute its west wing. They are No. 11 (tropical) and No. 12 (subtropical). Many famous plants are grown here—plants whose names are household words, such as allspice, bread-fruit, caper, cinnamon, ginger, indigo, ipecacuanha, mahogany, nutmeg, sarsaparilla, squill, and strychnine. But the lack of space and the necessity of growing the plants in pots preclude their attaining anything like a natural state. Many notable economic plants, however, are grown in the larger buildings, and may be found in the Palm House, Temperate House, Aroid House, etc., where they can be seen in a more characteristic state.

Growing in the porch of the central compartment of the T-Range (No. 10) is a collection of those curious and interesting plants popularly termed insectivorous or carnivorous. These plants possess the faculty of trapping insects by means of various devices, and of afterwards absorbing their juices. The object is probably to supply the plant with nitrogenous compounds which it is unable to acquire through the roots. In gardens, the best known of these plants are the Sarracenias, North American plants whose handsomely-coloured, erect leaves are hollow and trumpet-shaped. The inside of the "trumpet" is clothed with fine hairs all pointing downwards. These hairs offer no impediment to the luckless fly or bluebottle proceeding to the bottom, but effectually prevent its return. In the Droseras, or sundews, the leaf is covered with hairs tipped with a viscous substance like birdlime. When once a small insect has touched this, it is never allowed to escape.

A more remarkable plant than any other is the Venus's fly-trap, a dwarf plant from North America, whose leaves consist of two flat segments, or flaps, joined only at the base, and having the uppermost margins set with stiff bristles. In the centre of each segment are three other bristles, and when one of these is touched by an unwary insect the two segments of the leaf rapidly close together and hold it fast till its juices are all absorbed. Other members of this group are *Darlingtonia*, an ally of the *Sarracenia*s, from California; *Drosophyllum*, a kind of sundew from the Peninsula; and *Cephalotus follicularis* from South-west Australia, a dainty little plant with pitcher-like leaves.

PART V

THE HARDY PLANT COLLECTIONS

CHAPTER I

THE ARBORETUM

THE lover of trees and shrubs is attracted to Kew in two ways. The fine specimens scattered over its lawns and in its woods appeal to him by their beauty and size, and by their effectiveness in the landscape. But to the tree-lover who is connoisseur or student as well, the chief interest is in the botanical collections. In these collections all species that are hardy at Kew, and all really distinct varieties, are brought together, so that all the representatives of any genus can be found in a defined area. Thus the species and varieties of oak are all growing between the western end of the Sion Vista and the river; the elms near Brentford Gate; the limes near the Flagstaff, and so on. As far as possible, too, allied genera and natural orders are brought together. The oaks, sweet chestnuts, beeches, hornbeams, and birches—all members of the Cupuliferæ—are contiguous; all the members of the rose family are congregated round the Temperate House. The most attractive of the flowering shrubs, whilst they are all to be found in their proper place in the botanical collections, are also planted largely about the grounds in masses and groups. Such groups add much to the beauty of the gardens, especially in spring and summer, and they enable visitors who are interested to decide for themselves which are most suitable for their own gardens.

Every tree in the collections is labelled with its botanical name, its native country, and (when one exists) its popular title. The type of label now in general use at Kew is of lead. Smooth sheet lead is cut up into suitable sizes, and the name, etc., is then stamped on it by steel dies. Finally, the letters so made have white paint rubbed into them. The cheap and efficient labelling of trees has always been a difficult problem. This label, however, is cheap, quickly made, and is practically everlasting. The system

was started at Kew in 1892, and some of the original labels are still as good as when they were first exposed. Of course, they require an occasional cleaning and repainting.

It has already been pointed out in the historical part of this book that the extensive portion of Kew now known as the Arboretum

was originally called the Pleasure Grounds. Up to
Its 1895 it was separated from the northern part, or
Development. Botanic Garden, by an iron fence. Since then, no visible or actual boundary has existed between the two, and the term "Arboretum" is now taken to apply to that portion of the grounds given up mainly to the growth of trees and shrubs.

The original Arboretum in the Botanic Garden of 1760 was situated near the Temple of the Sun, where a few old trees still survive to mark the spot. It could only have covered three or four acres. In 1843, about forty-five acres were acquired from the (then) Pleasure Grounds for the purpose of forming an enlarged arboretum. The piece of ground includes the lawn on which the Seven Sister Elms stand. This scheme was, however, abandoned two years later, when the transference of the entire Pleasure Grounds of over 200 acres to the charge of Sir William Hooker made possible the creation of an arboretum on a much grander scale. The formation of the Kew Arboretum, as we know it now, was commenced in 1848. Its improvement and extension have been ever since the particular care of each director. At the present time it contains about 4,500 species and varieties of trees and shrubs, and is by far the most complete arboretum in existence.

In order to give some idea of the richness of the tree and shrub collections in Kew, it will be best to make an imaginary tour of the

A Tour of the Arboretum. This tour may be followed in reality by anyone desirous of studying thoroughly this fascinating branch of horticulture. The great work

of Bentham and Hooker, the *Genera Plantarum*, constitutes the basis of the nomenclature of all the plants in Kew, and the sequence of natural orders, groups, and genera it adopts is followed as nearly as possible in all the purely botanical arrangements. The first natural order of this work, Ranunculaceæ, will therefore make an appropriate commencement of our tour. Afterwards the route most convenient to the pedestrian will be taken. The plan printed on page 64 should be consulted.

A few yards south of the Victoria Gate, and close to the Temple of Bellona, is the collection of clematis. This genus, mainly composed of climbers, and so well known for the gorgeous flowers of the popular varieties, is our starting-point. It is the most important genus of hardy shrubs in Ranunculaceæ, and here are about thirty species, many of them trained on rough tree-branches. Moving southwards towards the Flagstaff, and keeping the Pagoda Vista as the right-hand boundary, we come to a depression known as the Berberis Dell.

Here are grown the barberries, magnolias, tulip-trees, St. John's worts, rock roses, tamarisks, and rose of Sharon, as well as numerous other genera of smaller size, like *Asimina* (papaw), *Xanthoxylum* (toothache tree), *Hymenanthera* (from New Zealand), *Azara* (from Chile), *Choisya* (from Mexico), and various others from North America, North Asia, and Europe. Bordering the Pagoda Vista on the west is a collection of hardy araliads, a group of plants allied to the ivy, but often attaining a tree-like form, and remarkable for the size and beauty of the leaves. Surrounding this dell is the collection of limes or lindens (*Tilia*). This genus, solely comprised of trees of large size, is well known by the common lime of streets and parks. Several more beautiful and more worthy sorts may be selected from this collection, especially those with silvery leaves and pendulous branches.

Passing out of the Berberis Dell over the slope of the hill surmounted by the Flagstaff, we reach the collection of maples (*Acer*). This extensive genus, represented here by more than fifty species, includes many handsome trees, some with coloured foliage, others remarkable for the beautiful shades of their autumnal colouring. The famous sugar maple of North America is here. Close by are other smaller collections: *Euonymus*, a handsome genus, including the spindle tree of Great Britain, remarkable for its scarlet and orange fruits; the bladder-nuts (*Staphylea*); and the buck-thorns (*Rhamnus*), including *R. Frangula*, the species whose charred wood is used in the manufacture of the finer qualities of gunpowder.

Crossing the grass avenue leading from the North Gallery to the main entrance of the Temperate House, we come to the collection of vines (*Vitis*). The grape vine, *Vitis vinifera*, although hardy in South Britain, does not ripen its fruit there with certainty, except



IN THE ARBORETUM: LATE AUTUMN

under glass. The genus to which it belongs is widely spread over both hemispheres, and of the hardy sorts there are between forty and fifty,

**Vines and
Sumachs.**

several of them popular in gardens for the great beauty of their autumn foliage. Opposite the vines are various species of sumach (*Rhus*). Most important among them in an economic sense is the lacquer tree of Japan (*Rhus vernicifera*). *R. Cotinus* is an ornamental species known as the "smoke plant," from the curious cloud-like appearance of its inflorescence. Two remarkable species—dangerous, too, when cut, to those who do not know them—are the poison ivy (*R. Toxicodendron*) and the poison sumach (*R. venenata*). Both have a singularly virulent juice, producing painful blisters and eczema-like eruptions. The foliage of most of the sumachs assumes brilliant tints in autumn.

Leaving the Ruined Arch (1759) on our left, we approach the Refreshment Pavilion, around which are planted the horse-chestnut and its allies. The common horse-chestnut, the

**Horse-
Chestnuts.**

most beautiful in its flowers of all the large trees, was introduced to England about the middle of the sixteenth century. It was known to have reached Western Europe by way of Constantinople, but for more than 250 years its native country remained unknown. Now we know that it grows wild in the mountains of Northern Greece. About a dozen species belonging to this genus are growing here, most of them ornamental in foliage as well as in flower.

We have now reached one of the most attractive of all the groups of hardy flowering trees and shrubs, the great natural order of Leguminosæ, the family to which the broom and gorse belong. They fill the area between the Pagoda Vista and the boundary wall on Kew Road, the Refreshment Pavilion marking the north extremity, the Pagoda and Rose Garden the south. During the flowering season, which lasts throughout April, May, and June, they make this part of the garden very gay. The trees among them with a notable beauty of flower are the Robinias ("acacias"), with white- and rose-coloured blossoms; the Sophoras (white); and the laburnums (yellow). Remarkable for their formidably-armed trunks and large scimitar-shaped seed-pods are the "honey-locusts" (*Gleditschias*). The Kentucky coffee-tree (*Gymnocladus canadensis*) is a striking tree, with noble foliage. Here are growing all the species and varieties of *Wistaria*. *W. chinensis*, most gorgeous of climbers,

is well known on country walls, but there are others quite distinct, and beautiful too. The shrubs, besides including the brooms (*Cytisus* and *Genista*), the gorse (*Ulex*), and other British kinds, are represented by numerous rarer species from the cool temperate latitudes of the northern hemisphere: Manchuria, Siberia, China, Japan, North America, and Europe. For sunny gardens, where the soil is not rich, this family supplies many beautiful shrubs.

Near the wall are growing the various species of hickory (*Carya*) and walnut (*Juglans*), closely allied trees that yield valuable timber

**Walnuts and
Hickories.**

and in some cases edible fruits. The southern boundary of the Leguminosæ is the Rose Garden, which is dealt with elsewhere, and which brings us to the southern limits of the gardens. Close by is the Lion Gate, opening on to Kew Road. We shall now cross the wide lawn on which the Pagoda stands, and which terminates the Pagoda Vista, to the avenue of Atlas cedars. To the north is the Temperate House, between which and this end of the Cedar Avenue are collected two of the most important groups of trees and shrubs—those that belong to the rose family and to the Saxifragaceæ.

Before traversing this section of the Arboretum, it will be worth while to note a few features of interest near the Pagoda. Here are

Old Cedars. a few cedars of Lebanon, the sole survivors of a numerous group planted about 1760, which Sir Joseph Hooker remembers to have covered the ground so thickly as to have completely hidden it from the view of anyone looking down from the top of the Pagoda.

Two large groups of heaths close by make bright patches of colour in their season. These broad patches of heath are a recent and

**Rare
Shrubs.** very attractive development in shrub-planting in Kew. The sandy, light soil suits them, and they remain in flower for a longer time than almost any other hardy shrubs.

Growing amongst them are colonies of rare and interesting plants, many of which it is found thrive best with the ground about them shaded as it is here by these heaths. Here, for instance, is the first plant of Brewer's spruce (*Picea Breweriana*) introduced to England; it represents a remarkable pendulous species from the Siskiyou Mountains of Northern California. Several specimens are present, too, of the rare South American beeches (*Fagus antarctica*, *betuloides* and *obliqua*); the two former species are the most prominent con-

stituents of the dark, sombre forests of Tierra del Fuego. There is a tree of the golden chestnut (*Castanopsis chrysophylla*), the lower surface of whose leaves is tawny yellow.

A little to the west of these heaths is a mound, on the slope of which a few Lebanon cedars are growing. This mound is interesting

as the site of "The Mosque," one of the numerous structures erected by Sir William Chambers about

Site of the
Mosque.

1760. It is a curious instance of the survival of names in a corrupt form that this mound should be still known among the workmen as "Moss Hill." On the south side of it there is a quaint avenue of Irish yews opening on to the Old Deer Park, across which, nearly a mile away, can be seen the old square tower of Isleworth Church. There is a similar avenue on the opposite side of the Pagoda.

CHAPTER II

BETWEEN THE HOLLY WALK AND PAGODA VISTA

RESUMING our inspection of the collections, we now turn our steps towards the Temperate House. A grass avenue extends from the gravel walk skirting the Old Deer Park to the south entrance of this house. This is called the Thorn Avenue. It is planted with a collection of thorns (Cratægus) and Pyrus. The genus Pyrus is a very extensive one, including, as it does, the crabs, pears, mountain-ashes, sorbs, and whitebeam trees. All are beautiful in flower, many also in fruit, and the same may be said with equal justice of the thorns. The large rectangular plots at the sides are planted with the same genera and their close allies—the medlars, quinces, and Amelanchiers. Surrounding these plots are straight formal borders, in which many kinds of rosaceous shrubs are grown; amongst them are roses, brambles and raspberries, Spiræas, Cotoneasters, Kerrias, and many smaller genera. This portion of Kew is most beautiful in April, May, and June—the flowering time—and again in September, when many of the fruits are ripe.

Keeping the long straight Holly Walk as our western boundary—it marks pretty nearly the track of the Love Lane of olden time and is now the dividing line between these collections and the woodland—several interesting genera belonging to the Saxifragaceæ may be inspected. The mock oranges (Philadelphus) make a beautiful display in June; the Deutzias flower earlier; Hydrangeas and Escallonias are later flowering, and both very favourite shrubs in South Devon and Cornwall. A large collection of currants and gooseberries, making the genus Ribes, is grown here in beds and as isolated specimens. Several of them, like *R. aureum* and *R. sanguineum*, may be included amongst the most ornamental of hardy shrubs; others are interesting as the wild types of the red, white, and black currants and gooseberries of fruit gardens.

We now proceed to the other (the north) end of the Temperate

House. If this house be skirted on the east side, the collection of laurels ("common" and "Portugal") may be inspected.

At the north end of the Temperate House, filling the space between it and King William's Temple, are ten long narrow beds. At Kew they are unofficially known as the "Canal Beds." As a feature of the landscape they are not attractive, but they afford very useful accommodation for a numerous and interesting collection of beautiful shrubs. The groups to which many of these shrubs belong are too small to occupy any separately defined area. Many genera, in fact, as represented here, have but one or two species; they are consequently grown in these beds, and arranged as nearly as possible according to their botanical relationship.

Of the more extensive ones, the most important is the genus *Prunus*, which is noteworthy as supplying pleasure-grounds with a great many beautiful trees and shrubs, and fruit gardens with their most valuable fruits. Here may be seen the wild types from which centuries of gardening skill have evolved the plums, cherries, apricots, etc., of to-day. They give an interesting object-lesson in what cultivation and selection by man will accomplish as compared with natural selection. It is a considerable gulf that separates Coe's Golden Drop plum from the sour harsh fruit of its parents, the wild *Prunus communis* and its allies, as they are growing here. A remarkable tree is *Prunus serrulata*, one of the Japanese cherries, of which there is a fine specimen at Kew. This tree grows but little in height, sending forth instead long, horizontal branches stretching far out on every side. These, when laden with white or slightly pink blossom, as they always are at the end of April, have a singular, beautiful, and peculiarly Japanese appearance. The Mahaleb cherry is another beautiful and graceful tree, of which several varieties may be seen. This collection of *Prunus* should be visited several times during April and May by those interested in hardy trees and shrubs, for every really hardy species is represented.

Traversing these beds, the visitor will find many other attractive things. The Viburnums, Diervillas, Forsythias, jasmines, all well known and popular shrubs; a collection of the true Syringas, or wild lilacs; the Halesias, or snowdrop-trees; the Elæagnuses; the sea-buckthorn (*Hippophæ*), laden with orange-coloured berries in autumn; the Buddleias; various members of the fragrant family of labiates, such as rosemary, lavender, and sage;

the Osage orange (*Maclura aurantiaca*); the sassafras of the United States, the Daphnes, the sweet gales (*Myrica*), the "Dutchman's pipes" (*Aristolochia*)—all these make but a fraction of the things growing in these beds. To the west of them is an irregular avenue composed of Catalpa trees and of two species of *Diospyros*—the persimmon and the date plum. Across the avenue, and still farther west, is a collection of boxes (*Buxus*).

We can now return to the south side of the mound, on which King William's Temple stands. Here the gravel path bifurcates and makes a circuit of the temple. This walk may be traversed first, for on each side of it are several interesting shrubs. Most prominent is a collection of ivies trained on poles and forming upright columns—a quaint and unusual method of cultivating this climber. Between the columns are small colonies of rare dwarf shrubs. On the north side of the temple a dwarf hedge of Penzance briars encloses a plot of ground devoted to rare heaths, rhododendrons, and other choice shrubs.

Having made this circuit and returned to the southern base of the mound, its flanks may now be traversed. Turning to the east, a large group of privets and their allies is the first object; then comes a similar group of the cornels (*Cornus*); and, bordering on the Pagoda Vista, a bed devoted to various members of the witch-hazel family.

The witch-hazels (*Hamamelis*) are remarkable shrubs, several species of which bloom in January and February, producing a great quantity of yellow flowers, the parts of which are like narrow, crinkled strips of gold-leaf. Still continuing round the base of the mound, we come to a historically interesting plant; it is a common mulberry, directly descended from Shakespeare's tree at Stratford-on-Avon. Only recently acquired for Kew, it is as yet small. The white mulberry (*Morus alba*), interesting as the tree on whose leaves the silkworm feeds, is represented by several specimens, as is also the paper mulberry, from whose inner bark the Japanese obtain a valuable paper. Across the gravel path running east and west is a lawn on which is growing the collection of honeysuckles (*Lonicera*).

Returning across this gravel path to the northern base of the mound, one sees, nearly opposite a drinking fountain, an opening to a vista which lets us in to the Ericetum, or collection of heaths and their allies. To this beautiful family Kew owes much of its



THE LAKE: POPLARS AND WILLOWS.

spring and summer attractions. The garden varieties of rhododendron and azalea are, from a purely gardening standpoint, the most important. They are grown elsewhere (see "Rhododendron Dell" and "Azalea Garden"). In this sheltered and charming nook only the smaller and more delicate species of rhododendron are cultivated, but the remainder of the collection of ericaceous plants is here. Large numbers of them are evergreen, and they help largely to give warmth and greenery to British gardens in winter. The various species of heath (*Erica*) succeed very well at Kew, especially those that flower in the spring. The several large groups of them in various parts of the grounds have already been alluded to.

In point of size, the strawberry-trees (*Arbutus*) are the most imposing members of the heath family grown here. They are beautiful evergreen trees; the best-known species grows on the islands of the Lakes of Killarney, and nowhere else in the British Isles. This is *Arbutus Unedo*, which every visitor to the lakes is expected to see and appreciate. A second species, *A. Andrachne*, comes from the mountain slopes of Greece, whilst a third is the madroño of the Californian woods. On the west side of the Ericetum are numerous varieties of *Calluna vulgaris*, the heather or ling of British moors and mountains. On the south side are all the hardy species of *Vaccinium*, many of which produce edible fruit, including the well-known bilberry, a moorland associate of the heather.

Skirting the western side of the Ericetum is the northern end of the straight gravel path, 800 yards long, known as the Holly Walk. On each side of it there is planted a collection of species and varieties of holly (*Ilex*), as complete as it can be made. Having inspected these, as well as some specimens of the Chusan palm (the only palm hardy in Kew), the visitor may return to the north end of the Holly Walk, where there is a group of nettle-trees (*Celtis*), and then bear westwards to the upper end of the Lake.

From this point two different detours may be made; the first would be to examine the collection of conifers, for it is here that the Pinetum commences. This excursion is, however, dealt with separately (see "The Pinetum"). At present a circuit of the Lake may be made with two objects in view: the enjoyment of the various changing aspects which a walk round it reveals, and the examination of the willows and alders on its banks.

CHAPTER III

BETWEEN THE SION VISTA AND THE THAMES

HAVING returned to the upper or north end of the Lake, our route will now take us westward across the Sion Vista to the Azalea Garden.

Ashes and Hornbeams. This feature of Kew is described elsewhere. At present it is only necessary to allude to the collections of trees in its neighbourhood. To the east and north are planted the ashes (*Fraxinus*)—amongst which the tall, mast-like stems of the white ash of North America are most conspicuous—and also several weeping varieties of the English ash. Striking almost due north from the centre of the Azalea Garden is an avenue known as the Hornbeam Avenue. Here the species of *Carpinus* and *Ostrya* are situated. On the western side are the collections of cobnuts and filberts (*Corylus*), of the planes (*Platanus*), and of the beeches (*Fagus*).

The common beech (*Fagus sylvatica*) has produced many interesting deviations from the type. The several weeping forms are popular garden trees, forming as they do natural shady
Beeches. arbours; then the variegated and purple beeches, of which there is here a good selection, are the most striking large trees with coloured foliage that we possess; and the cut-leaved sorts are also attractive.

Leaving the Azalea Garden altogether, and turning south-westwards with the "Hollow Walk Wood" on our right and the Sion Vista on the left, we may enter a pretty, curving, grassy
Sweet Chestnuts. walk, almost parallel with the latter. At the beginning of this walk—the "Chestnut Avenue"—we shall pass very near to the spot where, in 1754 and for a few years later, stood the Hermitage of Queen Caroline, one of the most famous of the several fanciful structures she erected in what were then the Royal gardens of Richmond. At each side of this avenue have been planted the different varieties of the sweet chestnut (*Castanea*



THE THAMES AND SION PARK AS SEEN FROM KEW GARDENS.

vulgaris), underneath which is a collection of ivies originally formed by Shirley Hibberd and acquired for Kew at his death.

Having passed through the chestnuts we arrive at the oaks, perhaps the most important of the tree collections in Kew. They cover several acres between the Chestnut Avenue and the

Oaks. river. Here are oaks from all the cool temperate parts of the northern hemisphere : from China, Japan, Manchuria, the Himalaya, California, Eastern United States, Caucasus, Asia Minor, Spain, and various parts of South and Eastern Europe, besides a large number of varieties of the two British species—the common and durmast oaks. Of the more interesting kinds the visitor will find here, a few may be mentioned : the kermes oak (*Quercus coccifera*), an evergreen bush on which feeds the kermes insect, the source of one of the finest and most durable of crimson dyes ; the golden oak of Cyprus (*Q. alnifolia*), with leaves tawny yellow beneath ; *Q. densiflora*, from Oregon and California, with leaves that are milk-white beneath when young ; various “ red oaks ” whose leaves turn brilliant red in autumn, especially *Q. coccinea* ; the big-leaved oaks of Europe, *Q. Mirbecki*, *conferta*, and *macranthera* ; the still bigger-leaved one of Japan, *Q. dentata* ; the evergreen Japanese species, *Q. acuta*, *glabra*, and *cuspidata*, with foliage like laurels ; several varieties of the “ ilex ” or holm oak ; and the cork oak (*Q. suber*). One thing that makes this collection of particular value and interest is the fact that many of the species and varieties are no longer obtainable in the United Kingdom.

At the southern limit of the collection of oaks is a mound known in Kew as “ Mount Pleasant.” It is worth examining, because it affords a very good example of the way to treat an abrupt eminence of this kind, where the soil is not good and the position, of course, dry. It is planted with a selection of flowering shrubs that thrive in dry, hot positions. Among them will be noticed double-flowered gorse, lavender, rosemary, various sorts of cistuses and rock-roses, Spanish broom, and lavender-cotton. When the gorse is in bloom this mound presents a brilliant and conspicuous mass of colour. Two other mounds at the lower end of the Lake close by are treated in a similar way.

We have now reached the western extremity of the gardens at present open to the public. Near the end of the gravel path which crosses the Sion Vista just here is the Isleworth Ferry Gate : this

gives egress to the towing-path on the banks of the Thames. From this point, too, there is a fine view of one of the noblest reaches of the river, and also of Sion House and park. On the flat meadow-land just across the river in Sion Park one of the minor battles of the Great Civil War was fought. Here in 1642 the Royalists under Rupert defeated the Parliamentarians under Colonel Hollis. A more famous Battle of Brentford was that of 1016, when Edmund Ironside defeated the Danes after expelling them from London, but the site of this encounter is not precisely known.

To finish our investigation of the tree collections, we have, however, to double back once more, following the gravel path just mentioned. After passing through a portion of the
Riverside Avenue. oaks, we arrive at a point where the path forks. By taking the right-hand route we should come to the southern entrance to the Rhododendron Dell. This important feature of Kew, as well as the Bamboo Garden which opens out from it, is described elsewhere. Just now, where the walk bifurcates, we will take the left-hand path instead. This will leave the Rhododendron Dell down below us on the right, and bring us, 350 yards farther on, to the beginning of the collection of elms. From this point it extends north-east as far as the Brentford Gate. Near us, on the left, is the pleasant promenade now called the Riverside Avenue. In the mid-eighteenth century this same spot was frequented, we are told, "especially on Sunday evenings, with a concourse of nobility and gentry. Stars and ribbons and garters glistened on the eye in uninterrupted succession . . . the translucent stream of Old Father Thames glided by with an equable and enviable placidity." That was in the days of the second George. Now warehouses, factories, and railway sheds fill the opposite banks of the river, and on our side a thick belt of trees and shrubs is needed to hide them from view. Unfortunately, it hides the river too.

There are not many true species of elm (*Ulmus*) in cultivation—about a dozen in all,—but the collection is increased greatly by
Elms. the large number of varieties that have sprung from the three native elms: *U. campestris* (common), *montana* (Scots or wych), and *glabra* (feathered). One of the most interesting species here is a North Asiatic one, *U. pumila*, an elm with small glossy leaves which do not fall until the new year is in. Among the more remarkable varieties of common elm is the cork-barked elm called



THE RHODODENDRON DELL: A GREY DAY

suberosa ; in this variety the younger branches are furnished with conspicuous ridges of corky bark, which give the whole tree a very distinct appearance. The variegated varieties, as well as the pendulous and erect-growing ones, are also noteworthy, and afford a good selection of garden trees. Near the Brentford Gate are planted several of the allies of the elm—Zelkova, Planera, and Aphananthe.

After the elms come the poplars, comprising such well-known trees as the aspen, abele, cottonwood, and balsam poplar. The ground here is too sandy and dry for these trees, and there are not many of large size. The birches alone

Poplars and
Birches.

remain to claim our notice, and they can easily be seen from afar by the large proportion of silvery trunks among them. The native birch is a beautiful tree ; no other birch is more graceful, but some, like the “paper” birch of North America and the Japanese *Betula ulmifolia*, are even more striking for their silvery-white trunks. In contrast, the dark, shaggy trunks of the North American river-birch will attract attention. In all, more than twenty species are grown here, besides numerous varieties.

Thus ends our tour. Without allowing for any deviations, it has given us a walk of three miles or more since we left the clematis near the Victoria Gate. We are now close to the big open lawn in front of Kew Palace. By crossing this towards the Museum (No. III.) we shall reach the Broad Walk and the Main Entrance.

CHAPTER IV

THE PINETUM

THE representatives of the great family of conifers (firs, spruces, pines, cypresses, etc.) are planted along the south side of the Lake and on both sides of the walk leading from the Isleworth Ferry Gate eastwards to the Holly Walk. The **Adverse Conditions.** former section is called the Northern Pinetum, the latter the Southern Pinetum. Although all, or nearly all, the species that are hardy at Kew are grown here, only a proportion of them reaches perfection. No plants suffer more from fog and smoke than do conifers. Probably the resinous nature of the wood and leaves causes the soot to adhere to them more tenaciously than to ordinary evergreens. At any rate, the conifers at Kew are always dirty. Workmen handling them, even in late summer, when fogs have been absent for months, soon resemble chimney-sweeps. Moreover, the hot, dry summers, so frequent in the Thames Valley, are inimical to the well-being of many conifers, especially the spruces and firs—moisture-loving trees that find in the wet, misty valleys of Scotland their most congenial surroundings. The pines succeed better at Kew than do most conifers, the open gravelly nature of the soil suiting them, and various members of the cypress group grow well in certain parts. Many of the conifers, however, achieve only a moderate success, and some are entire failures. The conditions required by the family as a whole are so varied that the best situation one could select would not perfectly suit them all. How much worse is it here, where neither soil, nor rainfall, nor atmosphere is what one would desire!

The first Pinetum at Kew was formed on the lawn near the Seven Sister Elms. It occupied a portion of the 45 acres which **The Old Pinetum.** were taken from the Pleasure Grounds and added to the original Botanic Garden in 1843. Here still are several of the trees that were planted about that date. Most notable of them is a fine specimen of *Pinus monticola*, now 65 feet high. The



IN THE PINETUM: REDWOODS AND CYPRESSES.

present Pinetum was originated and planned by Sir Joseph Hooker. It was planted in 1871-72.

A tour of the Pinetum may best be commenced near the head of the Lake on the south side. Its beginning is marked by a group of the Chilian *Araucaria imbricata*. It may here be noted that as nearly as possible all the conifers from the New World are planted on the right-hand side of the gravel path (going in the direction at present indicated), and the Old World representatives of the same genus are placed opposite to them. Next to the Araucarias come the hemlocks (*Tsuga*) of North America, whilst on the other side of the walk are those from Japan. Then come the firs (*Abies*), and following them the spruces (*Picea*). This brings us to the fine holly hedge surrounding a private nursery for trees. From the left-hand side of the gravel path, and near this hedge, a grass walk leads to King William's Temple. At the opening to this walk is a collection of those curious allies of the conifers, the Ephedras. Beyond, each side of the grass walk is planted with junipers.

From this point to the Isleworth Gate the space is entirely filled with pines, of which there is a very full collection, with some fine examples—such, for instance, as *Pinus Laricio* (Corsican pine), *P. Laricio pallasiana*, *P. Bungeana* (lace-bark pine), *P. Coulteri*, *P. lambertiana*, *P. Peuce*, and *P. flexilis*, a group of which brings us to the Isleworth Gate. Retracing our steps for 150 yards or so, we leave on our left the path down which we first came, and take the one leading south-eastwards to the Lion Gate. By it we shall reach the southern section of the Pinetum. At the base of a declivity on the left is the Lily Pond. We are now in the neighbourhood of that section of conifers known as the Taxaceæ, which consists of the yews and their allies. Among them are many beautiful evergreens. The yews are present in many varieties—spreading, columnar, variegated, and pigmy. There are a *Podocarpus* from Australasia, another from Chile, the remarkable *Torreya*s and *Cephalotaxus* from California and Japan, etc.

Leaving these, the next noteworthy tree is a fine “umbrella” pine (*Sciadopitys verticillata*) from Japan, and next to it come the *Cryptomerias*, also from Japan. On the other side are the Californian *Sequoias*, or *Wellingtonias*—perhaps the greatest tree wonders of the world. The mammoth tree, *Sequoia gigantea*, does not succeed so well here

Spruces and
Firs.

Pines and
Yews.

Redwoods
and
Cypresses.

as the redwood, *S. sempervirens*. Of the latter, the specimens here are some of the finest in Britain. From this point to the end of the Pinetum, some 150 yards farther on, the area is almost entirely occupied by the cypresses and Thuyas, most notable of which is a fine group of the numerous forms of Lawson cypress.

Just before reaching the eastern extremity of the Pinetum, a gravel path starts out at right angles from the one we have been traversing, and passes through the woodland to the Temperate House. Both sides of this end of the walk are occupied by a collection of larches. Here are the finest specimens in England of the West American larch (*Larix occidentalis*), and some good ones of the Japanese larch (*L. leptolepis*), both of particular interest as possible substitutes in Britain for the common European larch, the value of which as a timber-producing tree has deteriorated greatly through disease.

CHAPTER V

NOTABLE TREES

THE finer trees to be seen at Kew are scattered indiscriminately about the grounds. Excepting native species, they are nearly all growing on the areas that have been longest under cultivation. Many of them, in fact, are to be found on the site of the old Botanic Garden of 1760. The trees mentioned in this chapter do not by any means exhaust the remarkable specimens. But they serve, as far as space permits, to show that whilst Kew is unrivalled in the number of species it contains, it is not deficient in trees of individual merit and distinction.

The old Cedars of Kew are now sadly reduced in number compared with those of 1850. The smoke of Brentford and London has no doubt helped to shorten the lives of many of them. Still, about a score remain, scattered over various parts of the grounds. A good specimen, which stands near the Sun Temple, was planted there in 1762; and another, the finest that Kew now possesses, terminates the most northerly of the three vistas radiating from the Palm House. It is 69 feet high, with a trunk 14 feet 4 inches in girth.

Cedar of
Lebanon
(*Cedrus
Libani*).

On the same lawn as the Seven Sister Elms, there is a good specimen of the Chestnut-leaved Oak. It has a trunk 9 feet 2 inches in circumference. The species is found wild in two somewhat widely separate localities: the Caucasus and the mountains of Algeria. Its leaves are very much like those of the sweet chestnut.

Chestnut-
leaved Oak
(*Quercus
castanæfolia*).

Close to the Temperate Fernery there is an ancient specimen of the Chinese Wistaria, trained over a large iron cage. How long it has been growing on this spot one cannot say. It once covered the eastern end of the "Great Stove" built in 1761, for the Princess Dowager of Wales, by Sir William Chambers. When this house was pulled down in 1861 the wistaria was preserved. Although showing the effects of age, it usually makes a fine display of flowers in May.

Chinese
Wistaria
(*Wistaria
chinensis*).

A fine example of a species of hazel, the Constantinople Nut, grows about a hundred yards south of the Main Entrance. Its nuts are of little value as food, but they are enclosed in a large, curiously-divided receptacle. The trunk is 4 feet 5 inches in circumference.

Constantinople
Nut (*Corylus*
Colurna).

The oak which provides the cork that has become so important a requisite in civilised life is an evergreen species from South Europe.

A specimen of it on the same lawn as the Seven Sister Elms at Kew shows the corky character of the bark very well, but the species requires a warmer climate to succeed perfectly. Perhaps the finest grove of Cork Oaks in the British Isles is to be seen at Osborne, Isle of Wight.

Cork Oak
(*Quercus*
Suber).

Just inside the Main Entrance, on the left, is a noble representative of the Corsican Pine, 86 feet high and 9 feet 3 inches in circumference of trunk. It is said to be the oldest tree of its kind in Great Britain, having been brought from the South of France in 1814 by the famous botanist, R. A. Salisbury.

Corsican
Pine (*Pinus*
Laricio).

A few yards east of the Cactus House there stands one of the best specimens in England of Coulter's Pine of California. It is about 57 feet high, and its trunk is 7 feet 6 inches in girth. The most remarkable features are its long leaves—very similar in arrangement to those of a sweep's brush—and its enormous, heavy cones.

Coulter's
Pine (*Pinus*
Coulteri).

The Holm Oak is the noblest of all evergreen trees in the British Isles, if we exclude the pines, spruces, and firs, which belong to a totally distinct type of vegetation. It is a tree of South Europe, where it forms the dark, so-called "Ilex" groves. It reproduces, in the northern climate, the character of the olive more nearly than any other tree.

Holm Oak
(*Quercus*
Ilex).

The largest specimen at Kew (where the species thrives exceptionally well) is near the Victoria Gate. It is over 50 feet high, its branches cover a space 70 feet across, and its trunk is 12 feet round.

Of several notable Horse Chestnuts in Kew, the finest is between the Rhododendron Dell and the river. Its lower branches rest on the ground, where some have taken root. Its branches spread over an area more than 100 yards in circumference. Another noble tree is on the south side of the Lake, opposite the finest oak in Kew.

Horse Chestnut
(*Æsculus*
Hippocastanum).



AN OLD CORSICAN PINE.

Just inside Kew Palace gates, on a mound to the left, there stands what remains of a once magnificent lime. In its prime it was described as of singular beauty and great height. Under its shade the children of George III. used to sit "and pursue their youthful studies." The King's Lime was wrecked in the storm of January 27th, 1901, and nothing exists now but a portion of the trunk, from one part of which a vigorous young growth has sprung.

King's Lime
(*Tilia*
vulgaris).

Among the veterans of 1762 that still remain near the Sun Temple is a specimen of the North American Locust tree. Now past its best, it still is cherished as a historical curiosity. The Robinia is one of the most elegant of large trees, especially in regard to foliage, but it has never fulfilled the expectations once entertained as to its value as a timber tree in Great Britain.

Locust Tree
(*Robinia*
Pseudacacia).

Entering the Rhododendron Dell from the north end, the visitor is struck by an enormous specimen of the London Plane growing on the right-hand side. It is the common tree of the streets of London, seen in its full glory. This particular tree was praised and admired by Richard Jefferies in his "Nature near London."

London Plane
(*Platanus*
acerifolia).

Although a hybrid between two foreign species, the Lucombe Oak is of English origin. It was raised at Exeter in 1762, and its parents are the cork oak and the Turkey oak. It often retains its leaves throughout the winter. A fine example grows on the south side of the Sion Vista, between the Lake and the Palm House. It has a finely-proportioned head of branches supported on a trunk 12 feet in circumference.

Lucombe Oak
(*Quercus*
Lucombeana).

"Captain of the Western wood,
Thou that apest Robin Hood,
Green above thy scarlet hose
How thy velvet mantle shows."

So Bret Harte apostrophises the Madroño of California, comparing its green head of foliage and red branches with the traditional green doublet and red hose of the outlaw. There is an old specimen of it at Kew on the north side of the Broad Walk. Its bark is perfectly smooth and cinnamon-coloured, except at the forks, where are curious, rough,

Madroño
(*Arbutus*
Menziesii).

black patches. It is a goodly-sized tree for England, but a mere dwarf compared with those of the warm forests of California, where it attains 100 feet in height. It is a close ally of the *Arbutus* found at Killarney.

One of the best specimens of the remarkable Maidenhair tree in the British Isles stands near the Sun Temple. It was introduced in 1754, and was at one time trained upon a wall that stood here. It is a male, and is now 63 feet high and over 9 feet in girth of trunk. The tree, a last representative of one of the most ancient types of plants, and long unknown in a wild state, has, it is believed, been lately discovered wild in the forests of Central Yezo and in Western China. Previously it was only known as a cultivated tree, chiefly in the vicinity of temples in Japan.

The common Oaks in Kew do not constitute so notable and prominent a feature of the woods as the beeches, but a few fine examples are to be found. The largest is growing at the north-east end of the Lake. At five feet from the ground its trunk is 17 feet 4 inches in circumference.

The true Oriental Plane is a comparatively rare tree. The tree so common in the streets of London is *Platanus acerifolia*. Close to the Old Orangery (No. III. Museum) there is a very good example of the true *P. orientalis*, notable for its short, thick, finely buttressed trunk, which at its narrowest is 14 feet 6 inches in girth, for its ample spreading head, and for its handsomely cut leaves. The Oriental plane is one of the longest-lived of trees. On the banks of the Bosphorus stand trees under which the knights of Godfrey de Bouillon took shelter more than 800 years ago.

Close to the Sun Temple is growing a specimen of Persimmon which is probably the finest in the British Isles. It came in all likelihood from Whitton, and was planted where it stands in 1762. It is remarkable for the rough, picturesque bark on the trunk. It is now 65 feet high, and the trunk is 5 feet 6 inches in circumference.

The grassy terrace near the river between the Palace and the Brentford Gates is known as Queen Elizabeth's Lawn. It derives its name from an ancient Elm which stands near its centre. Tradition says that this tree was planted there by Queen Mary I., and that



A FINE MAIDENHAIR TREE.

her sister Elizabeth (who spent some of her girlhood in Richmond Old Palace) was wont to sit beneath it. It is now a mere wreck, but sufficient of the original trunk survives to show its once enormous size. According to a local historian, the upper part of this tree was blown down in 1844. At that time its trunk was over 3 yards in diameter. It figures in most of the illustrations of the castellated palace built by George III. in 1803.

Queen
Elizabeth's
Elm (*Ulmus
campestris*).

A little to the east of the Pagoda there stands one of the finest examples of the Red Oak in Great Britain. The species was introduced to England from North America about the period when Kew House came into Royal occupation, and this tree was probably planted soon afterwards. Its trunk is 14 feet in circumference. Although showing the effects of age, it is still healthy.

Red Oak
(*Quercus
rubra*).

One of the most characteristic trees in that region of wonderful trees, Western North America, is the Redwood. Not quite so big as the mammoth tree of Calaveras, it is, however, its nearest rival. Specimens have been measured that were 350 feet high, with trunks 50 feet in circumference. Its cultivation in England dates from the first half of the nineteenth century, so that British specimens are still juveniles. The largest example at Kew is in the southern section of the Pinetum; it is just over 70 feet high, and its trunk is about 9 feet in girth. It shows very well the red-brown, spongy bark that gives to the redwood forests of California their beautiful and striking appearance.

Redwood-
(*Sequoia
sempervirens*).

There are many fine Elms in Kew, but the only ones whose history is known stand in a row on the lawn south-west from the Broad Walk. The "Seven Sisters" are now but five, and some of those that remain are sadly disabled. They owe their popular title to having been planted by the seven daughters of George III.

Seven Sister
Elms (*Ulmus
campestris*).

Between the Conservatory and the Broad Walk there is the oldest and largest Sophora in Kew. The species, a native of China, was introduced into England in 1753, and this tree is one of five of the original importation that was obtained for Kew. Its trunk is very short, and is 12 feet 4 inches in girth. A few feet from the ground it divides into four great limbs, which

Sophora
japonica.

are held together by iron supports. Near the Pagoda is another tree; this has a clean trunk for about half its height, which is 70 feet.

No tree in Kew has a more individual or more characteristic appearance than the Stone Pine, of which a picture is here given. It stands a few yards to the north of the Cactus House. Its short trunk and wide-spreading, low branches render it quite distinct among pines. It is a familiar object in the Italian landscape. The famous forest of Ravenna, celebrated by Byron, was composed of this tree, but it was destroyed by the great frost of 1879-1880.

The Sugar Pine of California and Oregon is one of the most remarkable of its kind. It grows to a height of more than 200 feet, and its cones are sometimes 18 inches long. The best example at Kew, which is in the Pinetum, is 65 feet high.

The Sweet Chestnut thrives exceptionally well in the dry, hot soil of Kew, and some fine specimens occur in the Arboretum. The largest is in the Northern Pinetum, close to the collection of Old World firs. Its trunk is $20\frac{1}{2}$ feet in circumference. Another tree, midway between this and King William's Temple, is not so large, but is remarkable for the spiral arrangement of the corrugations of the trunk.

Of the many beautiful trees that have been introduced into Kew from North America, not one is more striking or more attractive than the Tulip-tree. Near the northern entrance to the Rhododendron Dell, and close to the big plane already mentioned, there is a finely proportioned example, which, although not so large as others in the United Kingdom, is still a notable specimen. It is 80 feet high, and its trunk is 9 feet 9 inches in girth. It flowers freely almost every summer.

The Turkey Oak thrives exceedingly well in the Kew soil. A specimen of magnificent dimensions, near the Sun Temple, is one of the historic group planted here in 1762. It is 80 feet high, and its trunk is 13 feet 8 inches in girth. The nobly-proportioned head of branches is 110 feet across. There is another good example of Turkey



AN OLD STONE PINE.

oak close to the Broad Walk, which more than half a century ago was mentioned as being a fine tree. Still another fine tree stands at the southern end of the Rhododendron Dell.

Yellow Wood Near the western wall of the garden of Cambridge
(*Cladrastis* Cottage there is a very good example of the interesting
tinctoria). Yellow Wood. It is a native of the Alleghany
Mountains. The Kew tree is 35 feet high, and
bears on its short thick trunk a head of branches 45 feet across.

CHAPTER VI

WALLS

PLANS of the village of Kew, as it was in the latter half of the eighteenth century, show that the portion of the gardens near the south side of the Green consisted then of a series of walled-in enclosures running back from the houses. They were originally the gardens of these houses. After it became the custom of the Royal Family to reside at Kew for a part of the year, these properties were gradually acquired by George III. The houses were used for his household, and these walled-in gardens were added to the Royal demesne. The old garden walls remained standing for many years. Several of them were removed by Sir William Hooker soon after he became director, and the only ones now remaining are a long wall enclosing the Herb Garden on its western side, and the walls surrounding the garden of Cambridge Cottage. A piece of wall that once belonged to the garden of Methold House (now the official residence of the director) still forms part of the private Orchid Houses near the T-Range. The mound to the west of the same Range, now surmounted by trees and planted with a collection of hardy ferns, is held up on the north side by a fragment of another of these ancient walls. This mound covers an old ice-well, and the wall was part of the boundary of the Botanic Garden of 1760.

It has long been recognised that walls are a very valuable adjunct to a garden. They not only give it shelter—and that is a great gain—but they render possible the successful cultivation of a number of shrubs and small trees which could otherwise scarcely be grown and brought to flower. It has for centuries been known to gardeners that many fruit trees, when nailed to walls, are much more fertile than in the open. A large number of foreign shrubs which are so tender that it is hopeless to attempt their cultivation under ordinary conditions, succeed admirably against

a wall. Amongst such plants there may be mentioned, as growing on the walls at Kew, the myrtle, the olive, the pomegranate, the kaki, and the loquat. Others, although quite hardy, need the heat and ripening influence of a south, east, or west wall to make them blossom.

At Kew, where plants are grown that come from nearly every latitude between the Antarctic and the Arctic circles, there is a considerable group of plants too tender to succeed out-of-doors entirely, but not tender enough to need greenhouse protection all the year round. Some of these can be cultivated in pots, placed outside in summer, and taken under cover in winter. But a better plan for many, because they can be planted out in permanence, is to give them a place on a wall. The old walls at Kew, their colour mellowed by the rain, sun, and frost of a hundred years, shelter a number of interesting and beautiful shrubs. They are arranged in no particular order. As a vacancy occurs it is filled up by the most suitable plant that is available. Here may be seen the blue-flowered *Ceanothus* from California; the *Escallonia* from Chile; the *Pittosporum* from New Zealand; the Chinese quince, the loquat, and the kaki from China and Japan; some of the tender plants of South Europe and the Mediterranean region; and others from the Himalaya, Mexico, Brazil, Peru, and Australia. Many of them are of great age, and others among the latest acquisitions to European gardens.

CHAPTER VII

HERBACEOUS PLANTS

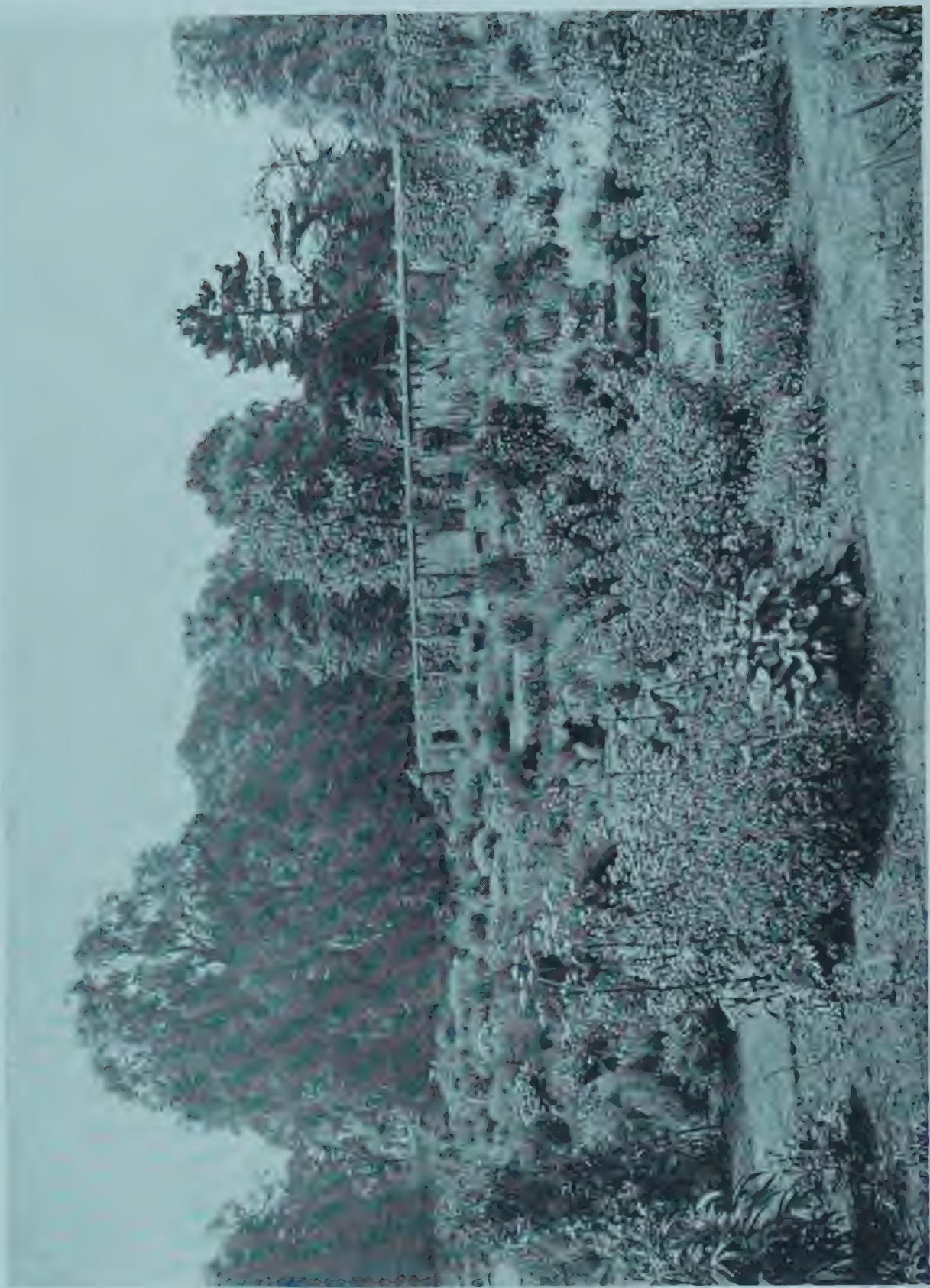
No phase of gardening has obtained more consideration from plant-lovers in recent times than the cultivation of hardy herbaceous plants.

Fashion in Gardens. In gardening, as in other things, fashion is apt to run a somewhat unreasonable, or even violent course.

People are not satisfied to give the fashionable plants of the day their due, or even more than their due place in the garden. Something else has to be sacrificed on their behalf. And just as the "conifer rage" of the middle nineteenth century led to the banishment of many beautiful flowering trees and shrubs of a deciduous nature from parks and pleasure grounds, so had the vogue for summer bedding about the same time a blighting effect on the cultivation of hardy herbaceous plants. All that, however, is past. The border of hardy plants is now a cherished feature of every garden. It is, indeed, a necessary one, for the supply of flowers in the outdoor garden during late summer and autumn is largely dependent on the herbaceous border. The vast majority of the flowering shrubs are over in England by mid-July. Another point in its favour is that, for the results obtained, it is one of the least expensive forms of gardening.

The term "herbaceous," strictly interpreted, should apply to all plants which do not form woody tissue, but gardeners usually limit it to hardy flowering plants that die down to the ground each winter. In temperate climates by far the greatest proportion of the vegetation, so far as regards number of types, is of this character. Of the total number of plants cultivated at Kew it is estimated that one-fourth are hardy herbaceous. They constituted an even more important element in the botanic gardens of earlier times, before the advent of the glass-house so greatly widened the possibilities of cultivating exotic plants.

The collection of herbaceous plants occupies the north-eastern



THE HERB GARDEN.

extremity of Kew. It is bounded on the east by a wall separating it from the Kew Road, on the west by one of the old walls of Kew, on the north by the Jodrell Laboratory and a private yard, and on the south by an embankment separating it from the walk leading to Cumberland Gate. Within these boundaries is the Herb Garden proper. The collection has, however, overflowed into the adjacent areas. The Rock Garden close by contains most of the Alpine plants; the irises are grown on a lawn near; and representatives of several natural orders of monocotyledonous plants find room on the piece of ground between the west wall of the Herb Garden and the Rock Garden. In the historical part of this book it is mentioned that one part of the old Botanic Garden of 1760 was called the "Physic Garden," and was given up to herbaceous plants arranged according to the Linnæan system. This Physic Garden was situated immediately south of the Temple of the Sun. Here these plants were cultivated until 1846-7, when the site of the present Herb Garden, then the Royal Kitchen Garden, was given to the nation by Queen Victoria.

The first account we have of the extent of the herbaceous collection at Kew is in the *Hortus Kewensis* of Sir John Hill, published in 1768. In this work 2,712 species are enumerated. By 1789 the number, according to W. Aiton, had increased to 2,824. During Kew's period of decadence (1810-40) the collection no doubt diminished, but on the authority of John Smith, the first curator, there were about 2,500 species in the collection in 1838. A catalogue drawn up in 1853 by James Niven, then foreman in Kew, but subsequently well known as the curator of the Hull Botanic Garden, enumerated over 4,000 species. In 1894 the collection comprised approximately "6,000 species and 1,000 well-marked varieties." By 1902, the date of the last published list, the number of species had increased to 7,000.

The arrangement of the plants in the Herb Garden proper is purely and frankly botanical. The whole area, about 210 yards by 80 yards in extent, consists of 170 rectangular beds, varying from 30 feet to 70 feet in length and usually 7 or 8 feet wide, with grass walks between. The species of each genus are brought together, as are also the genera belonging to the same natural order. The natural orders follow their proper

sequence as defined in the great work of Bentham and Hooker—the *Genera Plantarum*. As each species can only be represented by a single plant or small group of plants, this arrangement does not admit of the least attempt at picturesque grouping; but it enables the botanical student to compare allied species most conveniently, and the gardener to select the most ornamental. During the winter this part of Kew is rather depressing. The long array of rectangular beds of naked earth, with numerous labels marking the site of plants at rest beneath the ground, often suggests a cemetery to irreverent minds. But during summer and autumn it is one of the most delightful and most interesting sections. Here one can saunter over the soft turf inspecting a marvellous variety of plants concentrated in a very small space. Here a Rocky Mountains plant grows close by an ally from the Himalaya or from Northern Europe. There the newest introduction from China or the Caucasus stands against another closely-related plant whose name, perhaps, has been for centuries a household word. Monkshood, henbane, pimpernel, lady's mantle, thrift, columbine, hairbell, morning glory, love-lies-bleeding, marvel of Peru—all are here in their order. Even such weeds as nettles, plantains, docks, and dandelions have each their appointed place.

Of the great natural orders, that of the Composites occupies most space; it includes the asters, golden-rods, sunflowers, and very many more. It is on this family of plants that gardens most depend for the autumnal display of flowers. Other leading families are the Ranunculaceæ (buttercup family), containing many well-known and beautiful plants like the anemone, clematis, monkshood, columbine, and Christmas rose; the Caryophyllaceæ, with the pinks and *Silenes*; the Leguminosæ, or pea family, composed of many useful and favourite garden plants, such as lupines and sweet peas; the Cruciferae, early-blossoming plants with four-petalled flowers like *Aubrietia*, wall-flowers, and *Arabis*; and the Labiatae, the family of fragrant herbs, such as sage, the mints, thyme, rosemary, and lavender. The great family of grasses has always been well represented at Kew ever since the time of George III., whose agricultural tastes led him to take an interest in them. The fine collection now grown here is valuable in that it contains all the types of hardy grasses used for fodder.

The old botanic gardens of Great Britain—the most famous of

which were those of Oxford and Chelsea—were originally termed “physic gardens.” Their chief purpose was to supply material for the study and classification of plants used in medicine.

**Medicinal
Garden.**

The physician of earlier times was much more of a herbalist than his modern compeer, and that he had an extraordinary faith in the efficacy of many plants is shown by the old herbals. It has always been, even up to recent times, from the medical ranks that botany has drawn its most ardent devotees. But botany is no longer an essential element in the educational outfit of the physician. He may rest content, knowing the properties of his drugs, without concerning himself about their origin.

Near to and slightly north of Museum II. (which stands at the northern end of the Herb Garden) is a sunken rectangular plot devoted exclusively to herbaceous plants known in medicine and in the household. They are arranged in rectangular and circular beds, intersected by grass alleys. It is a singular fact that the great majority of people are quite ignorant of the source of many of the commonest condiments, drugs, and the like. How many, for instance, know that caraway seeds, so largely used by housewives and confectioners for flavouring cakes, are the seeds of a plant now wild in Britain and allied to the hemlock; or the source of peppermint, liquorice, or chicory? In this little medicinal garden at Kew is grown as complete a collection of plants producing medicines, perfumes, condiments, etc., as space will admit. Here one finds such well-known herbs as sweet marjoram, fennel, horehound, lovage, chamomile, lavender, and so on.

Most of the space given up to hardy ferns at Kew is appropriated by wild varieties and garden forms of British ferns. The

**Hardy
Ferns.**

great majority of these owe their existence in gardens to the exertions of a small band of enthusiasts who have made British ferns their special study, and who have searched assiduously for wild forms, as well as raised others in their own gardens. To one of them, the late Mr. W. C. Carbonell, of Rhiw Castle, Monmouthshire, Kew owes in a great measure the richness of its collection of British ferns. In 1887, he bequeathed to the nation the whole of his collection, consisting of over 4,000 specimens, many of them exceedingly rare. Most of these garden forms may be included under about eight species, and although they have been given Latin names of great length, it must be said that many of them

are so much alike as to require the eye of an expert to distinguish them. On the other hand, some are strikingly distinct, and all are beautiful. These hardy ferns fill a useful place in gardens; their soft, luxuriant foliage makes a delightful furnishing in summer for places too shady for shrubs or ordinary herbaceous plants; and if early flowering plants like cyclamens, snowdrops, Christmas roses have been planted amongst them, the dead, rich-brown fronds furnish an admirable setting for their flowers. In their cultivation the chief thing to remember is that they revel in abundant moisture.

A great advance has been made in hardy water-gardening since 1890. It is a long time since there has been so great an acquisition to garden plants as the hardy water-lilies with yellow, pink, and red flowers, raised by M. Latour-Marliac and his followers. Previous to their advent the only water-lilies that could be grown permanently in the open air were *Nymphæa alba*, the North American *N. tuberosa* and *N. odorata*, and their varieties. Now we have Nymphæas of every shade between pure white and rich crimson, and various tints of yellow as well.

At Kew the botanical collection of hardy aquatics is crowded in a raised brick tank, built in 1879, at the north end of the Herb Garden. There is not the smallest opportunity here for picturesque planting. The idea is to bring together for purposes of convenient study, either by the botanist or the gardener, as many types of water-plants as possible. But this tank is not big enough, and a really worthy water-garden is still a desideratum at Kew. A portion of the garden of the late Duke of Cambridge, which, by the favour of King Edward VII., is to be added eventually to Kew, will probably be utilised for this purpose. The cultivation of a large collection of aquatic plants is not so easy and simple as may appear. Of all plants they are, as a class, the most rampant and most spreading. A yearly overhauling, with a possible setting back and replanting, is essential, otherwise they soon grow together and get hopelessly mixed up. A piece of water which can be completely drained off when desired, is absolutely necessary. It should be large enough to allow each plant or group of plants to grow to such a size as will show its true character, and portions of it should be shallow enough to permit of the cultivation of bog-plants as well as pure aquatics.

The Pond near the Palm House is unsuitable in several ways.

It is too deep, and the water cannot be lowered to any appreciable extent ; and so long as the public prefer water-fowl, the presence even of a few purely ornamental water-lilies is precluded. The large Lake, too, has many disadvantages. The supply of water for the garden has to be drawn from it, and, owing to the river tides being only high enough at new and full moon for the Lake to be replenished, it varies very much in level. The recurring dryness of the margins in hot summer weather, which is the result, makes the cultivation of bog-plants unsatisfactory. Then the irresistible attraction which water has for children leads to the persistent trampling of the banks when the water is low, and in spring this means the destruction of many young shoots unless they are guarded by wire-netting or something else as unsightly.

CHAPTER VIII

HERBACEOUS BORDERS AND GROUPS

THE most important piece of herbaceous gardening in Kew—apart from the Herb Garden, which is only designed to show the raw material—is carried out on a wide border skirting the western side of the T-Range of glasshouses. This border is 350 feet long and about 24 feet wide. The position is open and sunny, and it has also the advantage of being in one of the most frequented parts of the gardens, whereby its educational value is enhanced. But a range of glasshouses is not a good or artistic background, although shrubs are planted to break the hard lines of the building. An old wall with its stone or brick mellowed by the sun and rain of many years, and partially covered with flowering climbers, makes a charming background. But such walls are not always available or suitably placed. An irregular belt of evergreen shrubs, planted so as to form bays and recesses, is a background easily made and always effective. It has the one disadvantage that the roots of the shrubs are apt to encroach upon the ground allotted to the herbaceous plants, for which reason the finer-rooted shrubs should be selected.

The planting and arrangement of such borders is a problem whose proper solution demands knowledge and experience. One way of gaining these is to visit some such border as this several times during the season, making notes of the names, height, colour, etc., of the plants used. The leading idea is to secure an uninterrupted succession of flowers, and to avoid the occurrence of bare patches of ground. Close planting is essential, and early things should be planted beside late ones, so that when the one has grown and flowered the other may take its place. It is well also to have a reserve ground from which fresh supplies can be brought to fill up vacant spots as they occur.

The intensive cropping implied in the best system of herbaceous



THE HERBACEOUS BORDER IN SUMMER

gardening necessitates at the outset the provision of as favourable a set of conditions as possible. Wherever a bed or border for these plants is made at Kew, a depth of about two feet of good soil is provided. The natural soil affords very little of this. With a sandy or gravelly bottom like that of Kew, no artificial drainage is needed, but a bottom layer of brick-rubble is a great advantage wherever the soil is close and heavy. It has the effect of keeping the border warm and comparatively dry in winter. An annual overhauling of these borders is imperative. The coarser-growing plants require to be dug up and divided into smaller pieces before replanting. The finer and more delicate ones need to be relieved from the pressure of encroaching and more vigorous neighbours. Good soil and rotted manure may be added where necessary as the work proceeds. In hot, dry weather mulching with short manure is a great help. In arranging the plants in a border of this kind, one's aim should not be to get them to form an even bank sloping from back to front. The bulk of the tallest plants should, of course, go to the back, but colonies of tall and medium ones should come boldly to the front, just as bays of "dwarfer" ones may recede well into the border, thus giving a broken and diversified surface.

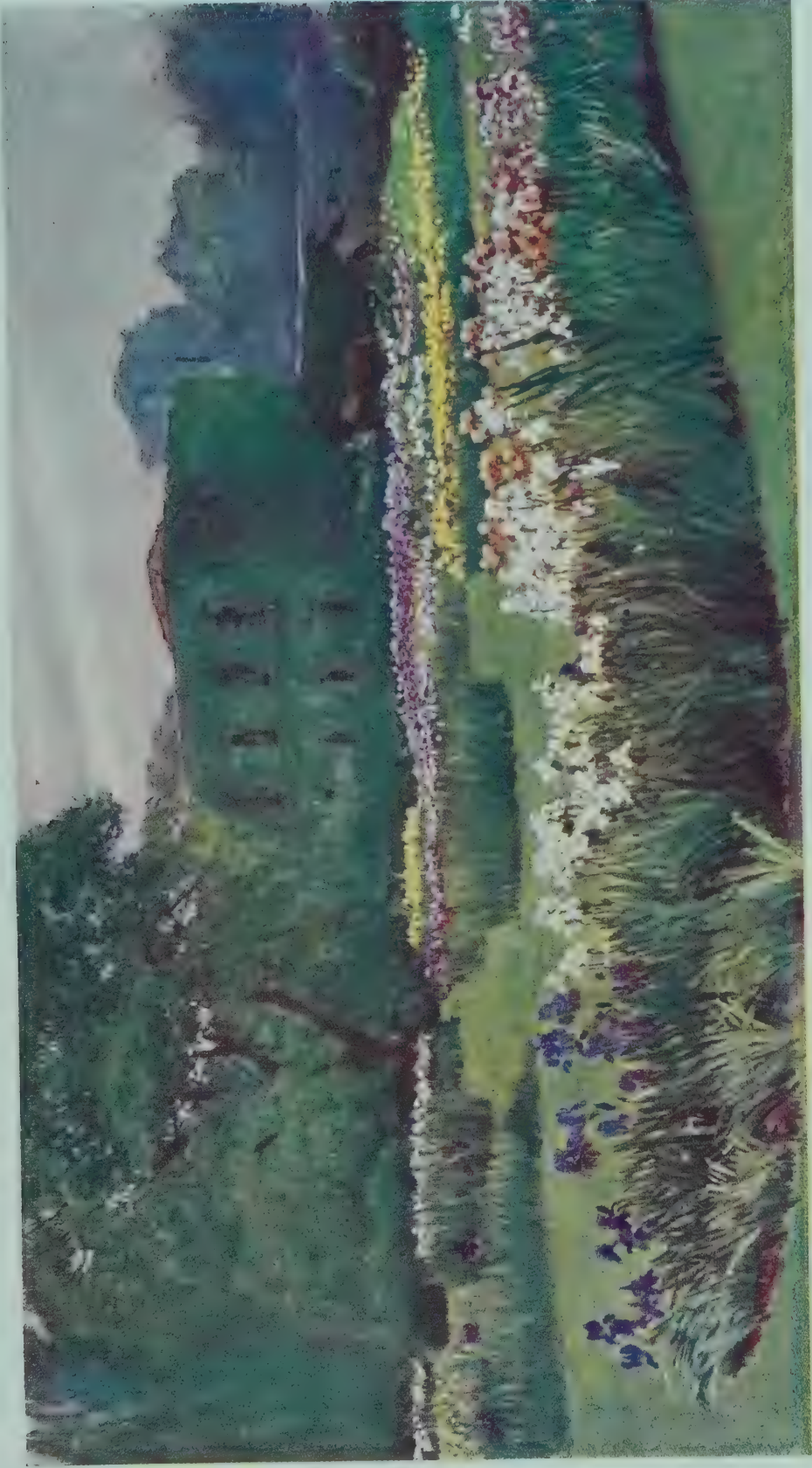
Scattered about the lawns at Kew are some scores of beds devoted to the cultivation of the most beautiful herbaceous plants.

Flower Beds.

As effects here must be broad and simple, these beds are usually filled with a single species, or with two or more chosen to enhance each other's beauty. In autumn or early winter many of them are filled with bulbs, like tulips, daffodils, or hyacinths, which flower in the spring. When their time is past they are dug up, ripened, and stored for the next autumn planting, their place in the bed being taken by later flowering herbaceous plants that have been growing in a private nursery. An opportunity is thus afforded to introduce to public notice the best new herbaceous plants as they appear and to present them in as advantageous a manner as possible.

The beautiful and gorgeous colouring of the irises, which is not surpassed even by that of the costliest orchids, has given them a very important place in the modern garden of hardy flowers. At Kew a piece of lawn about an acre in extent is devoted to them alone. The northern exit from the Rock Garden opens on to it. How charming a spot it is when the irises are

in blossom, with the old, ivy-covered Museum in the background, Mr. Olivier's picture amply tells. It consists of twelve large beds, 32 feet by 12 feet, and ten circular beds 12 feet in diameter, all cut out on the grass. Each large bed is planted with several distinct kinds belonging to one section of the genus. The most popular sections are *germanica*, *pallida*, *squalens*, *variegata*, *amoena*, *neglecta* and *pumila*. The English and Spanish irises each occupy a bed, and the remainder of the rhizomatous species are grouped in others. As the bulbous irises (excepting the English and Spanish) require more shelter and a warmer position, they are grown at the foot of the wall at the north end of the Herb Garden. Here some species, like *L. stenophylla* and *L. Danfordiæ*, are to be found in flower in January and February, followed closely by other allied species. On the same border are also grown the irises of the *Oncocyclus* group, commonly known as "cushion" irises, perhaps the most gorgeously coloured of all.



THE IRIS GARDEN

CHAPTER IX

THE ROCK GARDEN

A ROCK garden is nowadays universally deemed an indispensable adjunct to a garden of any pretensions. It is only in such a place that the beautiful Alpine and sub-Alpine floras can be adequately represented. Besides this, it affords the best possible place in which to grow many plants of lowland origin which need special care and watching. Yet the Kew rockery is comparatively young. Sir Joseph Hooker had long cherished the hope of providing Kew with a rock garden worthy of the name, but it was not until 1882 that an opportunity occurred of fulfilling it. In the previous year a number of gentlemen interested in this branch of horticulture had addressed a memorial to the Government praying for the formation of a rock garden worthy of the establishment. This memorial might have shared the fate of many similar documents had there not happened, soon afterwards, an event which brought the matter to a head. This was the death of Mr. George Curling Joad, of Oakfield, Wimbledon, a lover of Kew, who bequeathed to it his entire collection of Alpine and herbaceous plants. The acceptance of the bequest necessitated the preparation of a suitable place to grow them on, and a grant of £500 was made by Government for the purpose of constructing the present Rock Garden.

The raw material, if one may so term it, that Kew affords for a work of this kind is of a most unpromising sort. The surface of the ground is naturally an almost perfect level, the soil is sandy and poor, and it contains no rock or stone bigger than a goose's egg. The making of the rockery, therefore, was a purely artificial proceeding and, as such, might easily have developed, in unskilful hands, into an obtrusive object out of all harmony with its surroundings. That nothing of the kind has resulted everyone who knows the Rock Garden at Kew will

agree. It is generally admitted to be a most successful example of its particular style of gardening, carried out on a site which gave no natural help in its construction. It may, indeed, be accepted as a model to be copied where similar difficulties have to be overcome. The construction of a rock garden on sites where natural hills and hollows and out-cropping stone exist is a comparatively easy affair. All one has to do is to provide suitable accommodation for the plants, and to add or remodel whatever rockwork may be necessary without clashing with the general character of the surroundings. The introduction of a similar feature into an ordinary garden without any naturally picturesque contours presents a much more difficult problem. The best way is to adopt some plan suggested by Nature itself. This was what was done at Kew.

The general idea was to copy, as far as was practicable, one of those narrow mountain watercourses characteristic of certain parts of the Pyrenees. In these places the stream dries up during summer, leaving stranded on the banks fragments of rock and tree-stumps brought down by the winter torrent. A luxuriant herbaceous vegetation springs up on the banks during the summer, whilst above them a shrubby vegetation occurs. An imitable model was thus provided. In order to get the necessary depth with as little labour as possible, the soil was thrown up from the bottom on to the sides. The path representing the bed of the stream was laid out in a winding manner, by which means a considerable variety of exposures was provided, and a succession of different effects obtained. The exigencies of a public garden made it necessary that the path should be broad and smooth. In a private garden it might be much narrower, and instead of being gravelled, it might be paved irregularly with stones and slabs of rock. Numbers of inlets or recesses were made at the sides and, to give diversity to the scene, elevated mounds were formed on the promontories left by the curving of the walk. Two of these mounds, planted with Mount Atlas cedars, now 40 feet high, give height and dignity to the whole, and help to impart a sense of seclusion as well. This sense of seclusion, which most people feel to be conducive and proper to the study and enjoyment of the class of plants here grown, is further secured by planting the summits of the banks with evergreens. This is quite in keeping with the general idea of the mountain waterway just described. The presence of a feature like this Rock Garden amidst

the smooth, flat lawns and flower-beds of Kew, might easily have created a sense of incongruity, but this was avoided by shutting out any view of the immediate surroundings.

Owing to the limited amount of money available, it was not possible to build the rockwork from end to end—it is 270 yards long—with one kind of stone only, as would, of course, have been preferable. A quantity of finely-weathered pieces of Bath oolite was obtained, and also some water-worn limestone from the cliffs at Cheddar. At this time there existed in the Arboretum an old ruin, with a sort of cellar attached, known as the “Stone House.” It was said to have been constructed by the sons of George III. A certain spurious interest had gathered about this overgrown ruin through its having acquired the name of Merlin’s Cave. (The true Merlin’s cave of the Richmond Gardens stood, as has been told in an earlier page, on a spot near the southern corner of the present Lake.) The material of which the Stone House was built had, in the long course of years, sunk into the ground, and in digging it out several fine masses of marble and Portland oolite were found. All this furnished useful if somewhat mixed material for the Rock Garden. Some of the stones had been squared for building purposes, and the rather happy idea was adopted of imitating with them uptilted stratified rocks.

All these sources, however, did not furnish sufficient material for the whole length of the Rock Garden. In several places tree roots were employed for holding up the banks. This was adversely criticised at the time, but experience proved that, although somewhat of a makeshift, it was well worth doing. It enabled the whole scheme at the time to be worked on bigger lines, and the result has shown that very many naturally vigorous herbaceous plants revel in the humus formed by the decaying wood. Tree-stumps, of course, perish comparatively soon, but they have, as occasion served, been renewed, and in parts have been replaced by oolite obtained from Lord Redesdale’s estate in Gloucestershire.

The plants bequeathed by Mr. Joad amounted to 2,630, many of them choice and rare species. Although, at the time, they went a good way towards filling the Rock Garden, new species and varieties have been freely and continuously added ever since. Perhaps the most important genus is *Saxifraga*, of which there are some 200 species

and varieties. Of leading importance, too, are the Campanulas, gentians, Veronicas, Dianthus, and Silenes. Often growing on and attached to the stones themselves are numerous Sedums (stonecrops) and Sempervivums (house-leeks).

To provide as varied a set of conditions as possible, specially prepared sites were made. About midway in the Rock Garden there was formed a dripping well, the water from which, passing through a piece of ground made watertight twelve inches or so beneath the surface, forms a small bog. The most effective plants of this bog are species of *Rodgersia* from China and Japan, notable for their noble, finely-cut foliage. Here also may be seen fine plants of *Primula rosea* and *P. japonica*, marsh marigold (*Caltha*), and globe flowers (*Trollius*). In another place a bay made up of sea-sand is devoted to salt-loving or seaside plants, such as sea-holly, marram grass, sea-pea, thrifts, etc. In other bays prepared for peat-loving plants are numerous hardy orchids, rare species of *Gaultheria*, dwarf members of the heath family, *Cornus canadensis*, and many more. One of the most charming effects obtainable in a rock garden is where trailing plants are planted so as to hang over the face of large stones. Several of them are to be seen here; especially noticeable are *Iberis sempervirens*, *Onosma echinoides* (golden drop), *Arabis*, and *Aubrietia*. In one part many stones are clothed with the delightful *Arenaria balearica* (creeping sandwort), covering them in spring with innumerable tiny, white, star-like flowers.

At the southern end is a damp, shady recess, where are cultivated the Himalayan and Chinese *Meconopsis*, beautiful allies of the poppies.

In the same recess grow several species of lady-slipper, notably *Cypripedium spectabilis*, and in the chinks of the stones making up the steep sides the exquisite, rosette-like *Ramondias* thrive perfectly. Near the same place is a colony of hardy ferns, consisting of types found wild in Britain, and bordering the steps leading out towards the Cumberland Gate are fine masses of the Royal fern (*Osmunda regalis*). This part of the Rock Garden is very much beautified in summer by quantities of the willow gentian (*Gentiana asclepiadea*), both the blue-purple type and its white variety. In early spring much of the floral display is produced by bulbous plants, like the *Chionodoxas* (naturalised here), snowdrops and snowflakes, dog's-tooth violet (*Erythronium*), and

Trilliums. The anemones too, blue, white, and red, are to be seen in lovely patches.

But, after all, these are merely a few of the broader effects to be observed. The greatest charm of the Rock Garden at Kew is the number of dainty, gem-like plants that grow on its little ledges and plateaux and in its manifold nooks and corners. It is essentially a place for minute and detailed inspection. It is only by such a process and by repeated visits that its treasures can be found and enjoyed. It is filled with rare species and exquisite plants, of which the following are merely a few examples:—*Shortia galacifolia* and *S. uniflora*, *Schizocodon soldanelloides*, *Primula Palinuri*, *Galax aphylla*, *Gunnera magellanica*, and *G. arenaria* (small creeping plants, contrasting remarkably with the giant *G. manicata* growing on the banks of the Pond), *Kirengeshoma palmata*, *Rhodothamnus Chamæcistus*, *Myrsine africana*, *Senecio pulcher*, and *Podophyllum Emodi*.

CHAPTER X

THE ALPINE HOUSE

THIS small unheated house—in reality an adjunct to the Rock Garden—is situated at the north end of the Herb Garden close to No. II.

The Alpine Flora. Museum. First built in 1887, it was enlarged to its present size in 1891. It is now 40 feet long, 9 feet

wide and 8 feet 6 inches high. There is no more attractive flora on the earth than that which is found in high Alpine regions. As much of it as possible is represented in the Rock Garden, but there are many of the smaller species, which in a state of nature are covered with snow for six months of the year, that will not succeed there. The change from their half-year's sleep, warm and undisturbed beneath the snow, to the unrest of a winter and spring in the Thames Valley with its alternate freezing and thawing, is too violent for them. Then there are other plants, not necessarily Alpine, which flower early in the year, but whose blossoms are of too delicate a nature to withstand the buffeting and generally inclement conditions of that season out-of-doors. It is such plants which this house is designed to shelter and display. During most of the year they are grown in frames in shallow pots and pans plunged to the rim in ashes. Fully exposed nearly all the year, they can, however, be covered with the glass lights whenever necessary. As they approach the flowering state they are taken into the Alpine House, where the flowers can open and be enjoyed in comfort by visitors. The house begins to be attractive in the middle of December, and a succession of plants keeps it so until June. As the flowers fade the plants are returned to their original quarters in the frames.

At the beginning of the season the most important part of the display is made by bulbous plants. The most prominent are snow-drops, crocuses, species of narcissus, and bulbous irises. In January and February there are in flower, among others, the hardy cyclamens (*C. Coum* and *C. ibericum*), *Saxifraga Burseriana*, *S. apiculata*, and

Primula denticulata. As the season advances a much larger variety of plants comes into flower, including numerous kinds of

Some of the Plants. Androsace, Anemone, Achillea, Campanula, Chionodoxa, Dodecatheon, Dianthus, Saxifraga, Gentiana, Primula,

Iris, and Cypripedium. Many of the bulbous plants being leafless at the time of flowering, a few evergreen plants are introduced to supply the greenery that is lacking, such as Galax, Shortia, saxifrages, and Sedums. The gayest period is during the months of March and April, when, as a rule, more than a hundred different species and varieties may be seen in flower at a time, many of them rare.

